HP ProLiant Lights-Out 100 Remote Management User Guide

For HP ProLiant ML110 G4, ML115 G1, DL140 G3, DL145 G3, and ML150 G3 Servers

Part Number 419106-008
October 2008 (Eighth Edition)

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Intended audience

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

Contents

Operational overview 5
Overview 5
New features 5
Server management 5
Server management features 5
LO100 standard features 6
LO100 optional features 6
Installation of the HP Lights-Out 100c Remote Management Card 8
Remote management card kit contents 8
Preinstallation procedures 8
Installing the remote management card 9
Post-installation procedures 9
Configuration 10
Configuring network access 10
Configuring user accounts 10
Accessing BIOS Setup Utility and using function keys 11
Using the serial port 11
Enabling serial access to the LO100 11
Configuring the LO100 serial port 12
Using TCP/IP over Ethernet management port 13
Selecting an Ethernet management port 13
Obtaining a DHCP IP address from the BIOS Setup Utility 14
Setting up a static IP address from the BIOS Setup Utility 15
Enabling telnet and HTTP services 15
Updating the firmware 16
Remotely updating the firmware 16
Using LO100 18
Using SSL 18
Using SSH 18
Using the SSH utility 18
Using the PuTTY utility 19
Using the OpenSSH utility 19
Using CLP 19
CLP syntax 20
Base commands 21
Specific commands 25
IPMI 2.0 support 25
Logging in to LO100 26
Logging in through a web browser 26
Logging in through the CLP 26
Browser main menu options 27
Controlling server power remotely 28
Controlling server power from a browser 28
Controlling server power through the CLP 29

Monitoring sensors 29
Viewing sensor data from a web browser 29
Viewing sensor data from the BIOS Setup Utility 30
Platform event filtering configuration 30
Platform event trap configuration 32
Using the system event log 32
Accessing the system event log from a web browser 33
Accessing the system event log from the CLP 33
Accessing the system event log from the BIOS Setup Utility 33
Using Virtual KVM 34
Using the remote graphic console 35
System buttons 38
Using Virtual Media 39
Accessing the remote console through telnet 41
Redirecting BIOS console text through telnet 42
Redirecting a Linux console 43
Microsoft Windows EMS management 45
Hardware Inventory page 46
User administration 46
Changing user settings through a web browser 47
Changing user settings through the CLP 48
Network settings 48
Configuring network settings using a web browser 49
Configuring network settings using the CLP 49
Configuring network settings using the BIOS Setup Utility 49
Installing a license key 51
Importing a certificate 51
Creating a certificate 52
Installing a certificate or private key through a web browser 53
Installing a certificate or private key through the CLP 53
Resolving character and line feed issues 54
Technical support 57
HP contact information 57
Before you contact HP 57
HP SIM support 57
Acronyms and abbreviations 58
Index 61

Operational overview

Overview

This guide discusses the standard and optional operational features of the LO100 used in HP ProLiant ML110 G4, ProLiant ML115 G1, ProLiant DL140 G3, ProLiant DL145 G3, and ProLiant ML150 G3 servers.

New features

This release of LO100 adds support for the following:

- Updated user interface
- Update CLP support
- Updated Java™ support to include JRE 1.4.2 up to 1.6
- Updated remote console mouse control

Server management

HP ProLiant Lights-Out 100 delivers basic remote control of vital server resources, supports IPMI 2.0, and provides system administrators with access to the server at any time, even before an operating system is installed on the server.

HP ProLiant Lights-Out 100 provides text mode console redirection, DMTF SMASH compliant command line interface, and browser access to many of the same system management functions. You can access LO100 through a dedicated Ethernet port or through the server serial port.

Server management features

With HP ProLiant Lights-Out 100, you can perform the following tasks:

- Access a remote graphic console (Virtual KVM)
- Access the serial console of the host operating system over the network using standards-based client utilities
- Switch between serial console redirection or the LO100 command line interface
- Communicate securely using SSL and SSH
- Remotely control the power button of the server (power on and off the server), or perform warm or cold server reboots
- Remotely monitor fan speed and system power state (S0 or S5)
- Access the system event log

- Access virtual media
- Configure TCP/IP settings for the LO100 NIC
- Control user access
- Discover, identify, and launch LO100 from HP SIM
- Access LO100 and server controls using a standard browser or new industry-standard SMASH CLP command line interface
- Access command line help
- Manage the server with IPMI 2.0 compliant applications
- Access telnet

Not all of the features displayed and described in the guide are available on all systems. To verify which features are supported on your system, see "LO100 standard features (on page 6)" and "LO100 optional features (on page 6)" for more information.

LO100 standard features

In-band IPMI 2.0 elements available through the operating system are a standard feature of HP ProLiant ML115 G1, ProLiant ML110 G4, and ProLiant ML150 G3 servers.

The standard features of HP ProLiant DL140 G3 and ProLiant DL145 G3 servers include the following:

- In-band IPMI 2.0 elements available through the operating system
- Web browser access (HTTP) to power control, system event log, hardware status, and license key activation of optional features
- SMASH CLP interface access to remote power control, system event log, hardware status, and operating system serial console

LO100 optional features

HP ProLiant ML115 G1, ProLiant ML110 G4, and ProLiant ML150 G3 server optional features are activated with installation of the HP Lights-Out 100c Remote Management Card and include the following:

- Support for SSL, SSH, and IPMI 2.0 security with factory-default self-signed certificates and keys
- Support for imported certificates
- Virtual media access
- Remote graphic console (Virtual KVM) access

HP ProLiant DL140 G3 and ProLiant DL145 G3 server optional features are activated with the purchase of an optional features package. Two feature packages are available:

- The Lights-Out 100i Select Pack includes the following features:
  - Support for SSL, SSH, and IPMI 2.0 security with factory-default self-signed certificates and keys
  - Support for imported certificates
  - Virtual media access
- The Lights-Out 100i Advanced Pack includes the following features:
  - All features in the Lights-Out 100i Select Pack

- Virtual KVM

Installation of the HP Lights-Out 100c Remote Management Card

Remote management card kit contents

Installation of the HP Lights-Out 100c Remote Management Card is required to activate the optional features of the HP ProLiant ML115 G1, ProLiant ML110 G4, and ProLiant ML150 G3 servers. See "LO100 optional features (on page 6)" for more information.

The HP ProLiant Lights-Out 100c Remote Management Card Kit includes the following components:

- HP Lights-Out 100c Remote Management Card
- Spacer support
- Remote management card installation instructions

Preinstallation procedures

The installation procedures in this document are intended for individuals who are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

WARNING: Failure to properly turn off the server before you open the server may cause serious damage to the equipment as well as bodily harm.

CAUTION: Follow the ESD precautions listed in your server guide when handling the remote management card.

IMPORTANT: Observe the pre- and post-configuration procedures described in later sections when installing the remote management card.

NOTE: The procedures described in this section assume that the server is positioned on a flat, stable surface.

1. Back up the server data.
2. Shut down the operating system as outlined in the operation system instructions.
3. Power off the server and all the peripherals connected to it.
4. Unplug all cables from the power outlets.
5. Label each cable, if not already labeled, to expedite reassembly.
6. Disconnect telecommunication cables to avoid exposure to shock hazard from ringing voltages.
7. Open the server according to the instructions described in your server manual.

Installing the remote management card

1. Remove the access panel.
2. Carefully lay the server on its unexposed side to gain access to the system board.
3. Locate the remote management card connectors on the system board.
4. Install the remote management card in the connectors on the system board.

Post-installation procedures

1. Be sure all components are installed according to the installation procedures.
2. Be sure you have not left any loose tools or parts inside the server.
3. Reinstall any expansion boards, peripherals, board covers, and system cables previously removed.
4. Reinstall the system covers.
5. Connect all external cables and the AC power cord to the system.
6. Press the power button on the front panel to power on the server.

Configuration

Configuring network access

Your server is connected to the network using a standard Ethernet cable. Through this connection, you can access the remote management CLP, verify POST remotely, and access the BIOS Setup Utility remotely.

To configure network access:

1. Connect a standard Ethernet cable from the LO100 to a network jack.
   - On HP ProLiant ML150 G3, ProLiant ML110 G4, and ProLiant ML115 G1, servers, connect the NIC port on the remote management card.
   - On HP ProLiant DL140 G3 and ProLiant DL145 G3 servers, connect the onboard LO100 NIC.
2. Obtain the DHCP IP address, by using either of the following methods:
   - Look at the DHCP clients table.
   - Press the **F10** key during POST, and obtain the IP address from BIOS Setup Utility under Advanced/IPMI/LAN Setting. See "Obtaining a DHCP IP address from the BIOS Setup Utility (on page 14)" for more information.

   By default, LO100 has DHCP enabled and automatically negotiates an IP address.
3. With the DHCP IP address, use telnet to log in to the remote management CLP, or use a web browser to access the HTML interface.

To set up a static IP address, see "Setting up a static IP address from the BIOS Setup Utility (on page 15)" for more information.

Configuring user accounts

LO100 supports four accounts types, with varying levels of permissions to view and control features. For more information on user accounts, see the "User administration (on page 46)" section. Two accounts are available by default, one of type administrator and one of type operator.

The administrator account enables the user to execute the full set of CLP commands and change management processor configuration. The default administrator account user name is *admin,* and the default password is *admin*.

The operator account enables the user to execute common commands and functions but restricts access to specific functions, such as adding and changing user account information and changing the configuration of the management processor. HP recommends logging in with the operator account to perform common functions. The default user name is Operator, and the default password is Operator.

For more information on how to log in to LO100, see the "Logging in to LO100 (on page 26)" section.

Accessing BIOS Setup Utility and using function keys

Throughout the document, the F10 key is listed as the standard method of accessing the BIOS Setup Utility, saving changes, and exiting the utility. In some cases, the function keys (F keys) might not pass through the telnet client correctly to the remote system. If this occurs, use the following ESC key equivalents:

- F8—ESC+8
- F10—ESC+0
- F12—ESC+@

Using the serial port

The server serial port provides basic serial port functionality and serves as an interface to LO100. You can configure the system serial port for exclusive use with LO100.

△ **CAUTION:** After enabling the serial port for use with LO100, legacy serial devices might not function correctly if attached to the serial port.

You must configure the LO100 serial port hardware parameters to work with your respective serial port communications software. LO100 serial port configuration is controlled through the BIOS Setup Utility.

Enabling serial access to the LO100

1. Power up the server.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.
4. Choose one of these options:
   - On HP ProLiant ML110 G4 and ProLiant ML150 G3 servers:
   a. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
   b. Press the down arrow (↓) key to scroll to Serial Port Assignment. Press the **Enter** key to toggle between System and BMC. Select **System.**
   c. Press the down arrow (↓) key to scroll to Serial Port Switching. Select **Enabled.**
   d. Press the down arrow (↓) key to scroll to Serial Port Connection Mode. Select **Direct.**
   e. Press the **Esc** key to return to the Advanced menu.
   f. Press the down arrow (↓) key to scroll to IO Device Configuration. Press the **Enter** key.
   g. Select **Serial Port A,** and press the **Enter** key to toggle between Enabled and Disabled. Select **Enabled.**
   - On HP ProLiant ML115 G1 servers:
   a. Press the down arrow (↓) key to scroll to the Serial Port Configuration menu. Press the **Enter** key.
   b. Press the down arrow (↓) key to scroll to Serial Port Assignment. Press the **Enter** key to toggle between System and BMC. Select **System.**
   c. Press the down arrow (↓) key to scroll to Serial Port Switching. Select **Enabled.**

d. Press the down arrow (↓) key to scroll to Serial Port Connection Mode. Select **Direct.**
e. Press the **Esc** key to return to the Advanced menu.
f. Press the down arrow (↓) key to scroll to IO Device Configuration. Press the **Enter** key.
g. Select **Serial Port 1** and press the **Enter** key to toggle between Enabled and Disabled. Select **Enabled.**

- On HP ProLiant DL140 G3 servers:

a. Press the down arrow (↓) key to scroll to IO Device Configuration. Press the **Enter** key.
b. Press the down arrow key (↓) to scroll to the Serial Port menu. Press the **Enter** key to toggle between Serial, Shared, and BMC. Select **Shared.**
c. Press the down arrow (↓) key to scroll to Serial Port A. Select **Enabled.**
d. Press the **Esc** key to return to the Advanced menu.
e. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
f. Press the down arrow (↓) key to scroll to the LAN Settings submenu. Press the **Enter** key.
g. Confirm the following settings:
   - BMC Telnet Service: [Enabled]
   - BMC Ping Response: [Enabled]
   - BMC HTTP Server: [Enabled]

- On HP ProLiant DL145 G3 servers:

a. Press the down arrow (↓) key to scroll to IO Device Configuration. Press the **Enter** key.
b. Press the down arrow key (↓) to scroll to the Serial Port Mode. Press the **Enter** key to toggle between Serial, Shared, and BMC. Select **Shared.**
c. Press the down arrow (↓) key to scroll to Serial Port A. Select **Enabled.**
d. Press the **Esc** key to return to the Advanced menu.

5. Press the **F10** key to save and exit.

Configuring the LO100 serial port

1. Power on the server by pressing the Power On/Off button on the front panel.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.
4. Choose one of these options:

- On ML110 G4 servers, perform the following steps:

a. Press the down arrow (↓) key to scroll to the Console Redirection menu. Press the **Enter** key.
b. Set Serial Port Address to **COM A.**

- On ML115 G1 servers, perform the following steps:

a. Press the down arrow (↓) key to scroll to the Console Redirection menu. Press the **Enter** key.
b. Set Console Redirection to **Enabled.**
c. Press the **Esc** key to return to the Advanced menu.
d. Press the up arrow (↑) key to scroll to the IO Device Configuration menu. Press the **Enter** key.

e. Set Serial Port1 Address to **3F8/IRQ4.**

- On DL140 G3 servers, perform the following steps:

a. Press the down arrow (↓)key to scroll to IO Device Configuration. Press the Enter key.

b. Set Serial Port A to **Enabled.**

- On DL145 G3 servers, perform the following steps:

a. Press the down arrow (↓) key to scroll to the Console Redirection menu. Press the **Enter** key.

b. Set Com Port Address to **On-board COM A.**

- On ML150 G3 servers, perform the following steps:

a. Press the down arrow (↓)key to scroll to IO Device Configuration. Press the **Enter** key.

b. Set Serial Port 1 to **Enabled.**

c. Set Serial Port1 Address to **3F8/IRQ4.**

d. Set Serial Port 2 to **Enabled.**

e. Set Serial Port 2 Address to **2F8/IRQ3.**

5. Review the serial port settings, and make sure the settings match the serial port communications software settings used to connect to LO100.
6. Press the **Esc** key to return to the previous screen, or press the **F10** key to save the changes and exit Setup.

Using TCP/IP over Ethernet management port

You can configure LO100 LAN port access using two different Ethernet ports: the dedicated 10/100 LO100 management port or through a side-band connection using the server NIC. The side-band, shared, or UMP options utilize one server Ethernet port for both server network traffic and LO100 network traffic reducing the number of network cables that you must attach to the server.

Selecting an Ethernet management port

To select a shared Ethernet management port:

1. Power on the server by pressing the Power On/Off button on the front panel.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.
4. Choose one of these options:

- On ProLiant ML110 G4 servers:

a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.

b. Press the down arrow (↓) key to scroll to Share NIC Mode option. Press the **Enter** key to toggle between Enabled and Disabled. Select **Enabled.**

- On ProLiant ML115 G1 servers:

a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.

b. Press the down arrow (↓) key to scroll to the BMC LAN Configuration menu. Press the **Enter** key.

c. Press the down arrow (↓) key to scroll to Share NIC Mode option. Press the **Enter** key to toggle between Enabled and Disabled. Select **Enabled.**

- On ProLiant DL140 G3 servers, press the down arrow (↓) key to scroll to NIC Option. Press the **Enter** key to toggle between Dedicated NIC or the Side-band NIC. Select **Side-band NIC.**
- On ProLiant DL145 G3 servers:

a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.

b. Press the down arrow (↓) key to scroll to the LAN Configuration menu. Press the **Enter** key. The LAN Configuration screen appears.

c. Press the down arrow (↓) key to scroll to LAN Controller. Press the **Enter** key to toggle between NIC and UMP. Select **UMP.**

- On ProLiant ML150 G3 servers:

a. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.

b. Press the down arrow (↓) key to scroll to Share NIC Mode option. Press the **Enter** key to toggle between Enabled and Disabled. Select **Enabled.**

5. Press the **Esc** key to return to the previous screen, or press the **F10** key to save the changes and exit Setup.

The dedicated TCP/IP over Ethernet management port, whether dedicated or shared, is a standard Ethernet 10/100Mb interface that is connected to the network using a standard Ethernet cable. Before using the dedicated management port, you must determine the DHCP IP address, set a static IP address, or use the default static IP address.

Obtaining a DHCP IP address from the BIOS Setup Utility

By default, LO100 has DHCP enabled and automatically negotiates an IP address. To view the DHCP IP address, run the BIOS Setup Utility or retrieve the DHCP IP address using CLP through the serial port connection. To view the DHCP IP address using the BIOS Setup Utility:

1. Power on the server by pressing the Power On/Off button on the front panel.
2. When POST displays the message, `ROM-Based Setup`, press the **F10** key. If the server has an administrator password configured, the system prompts you to enter the password. If the server does not have a password configured, the main screen of the BIOS Setup Utility appears.
3. Press the right arrow (→) key to navigate to the Advanced menu.
4. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
5. To obtain the DCHP IP address, choose one of these options:
   - On ProLiant ML110 G4 and ProLiant ML150 G3 servers, press the down arrow (↓) key to scroll to the end of the menu to display the DHCP IP address.
   - On HP ProLiant ML115 G1 servers:
     i. Press the down arrow (↓) key to scroll the BMC LAN Configuration menu. Press the **Enter** key.
     ii. Press the down arrow (↓) key to scroll to the end of the menu to display the DHCP IP address.
   - On ProLiant DL140 G3 and DL145 G3 servers:
     i. Press the down arrow (↓) key to scroll to the LAN Settings submenu. Press the **Enter** key.
     ii. Note the DHCP assigned IP address for future reference.
6. Press the **Esc** key to return to the previous screen, or press the **F10** key to save the changes and exit Setup.

To configure or change your network settings, see "Network settings (on page 48)" for more information.

Setting up a static IP address from the BIOS Setup Utility

By default, LO100 has DHCP enabled and automatically negotiates an IP address. To disable DHCP and enable a static IP address:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. To set your network BIOS settings, choose one of these options:
   - On ProLiant ML110 G4 and ML150 G3 servers:
   a. Press the down arrow (↓) key to scroll to the end, and select **DHCP IP Source.**
   b. Set DHCP IP Source to **Disabled.**
   c. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** key to move between address fields).
   - On ProLiant ML115 G1 servers:
   a. Press the down arrow (↓) key to scroll to the BMC LAN Configuration menu. Press the **Enter** key.
   b. Press the down arrow (↓) key to scroll to the end, and select **DHCP IP Source.**
   c. Set DHCP IP Source to **Disabled.**
   d. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** key to move between address fields).
   - On ProLiant DL140 G3 and ProLiant DL145 G3 servers:
   a. Press the down arrow (↓) key to scroll to the LAN Settings submenu. Press the **Enter** key.
   b. Set the IP Address Assignment to **Static.** This setting enables you to modify a static IP address through the BIOS Setup menu.
   c. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** or period (**.**) key to move between address fields).
5. Press the **F10** key to save and exit.

To restore DHCP, see "Configuring network settings using the BIOS Setup Utility (on page 49)."

Enabling telnet and HTTP services

On ProLiant DL145 G3 servers, HTTP and telnet enabled by default. On ProLiant ML110 G4, ProLiant ML115 G1, and ProLiant ML150 G3 servers, HTTP and telnet are enabled after installing the HP ProLiant Lights-Out 100c Remote Management Card.

To enable telnet and HTTP on ProLiant DL140 G3 servers:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. Press the down arrow (↓) key to scroll to the LAN Settings submenu. Press the **Enter** key.
5. Press the down arrow (↓) key to scroll to the following settings, and set the parameters as needed (the following example shows configuring for LO100 access using telnet and a web page):

- BMC Telnet Service: [Enabled]
- BMC Ping Response: [Enabled]
- BMC HTTP Server: [Enabled]

Updating the firmware

To update the LO100 firmware, use the ROMPaq utility. Downloads for the ROMPaq utility are available on the HP website (http://www.hp.com/support). For more information about using the ROMPaq utility, refer to the HP website (http://www.hp.com/servers/manage).

NOTE: LO100 does not support ROMPAQ flashing from a virtual floppy.

After the ROMPaq utility flashes the selected device, cycle power manually to reboot the operating system.

Remotely updating the firmware

Use the `load` command to remotely update the LO100 firmware. The firmware file must be an uncompressed firmware image file created using the DOS ROMPAQ utility found on the Lights-Out 100 Firmware Upgrade Diskette Utility, which is available for download from the HP website (http://www.hp.com/servers/lights-out).

To create an uncompressed image file, enter the following command at the DOS prompt:

```
ROMPAQ /D <infile> <outfile>
```

where <*infile*> is the ROMPAQ firmware image file and <*outfile*> is the file name for the uncompressed binary image file. For example:

```
ROMPAQ /D cpqq0801.D14 ldrImage.bin
ROMPAQ Firmware Upgrade Utility, Version 5.02 (R)
Copyright (c) Hewlett-Packard Corporation, 1994-2006
Input file:   CPQQ0801.D14
Output file:  LDRIMAGE.BIN
```

The `load` command is used to retrieve a binary image from a specific source location (specified as a URL) and place it at the specified target address.

The `load` command can download and flash an `ldr` firmware image file using TFTP from the specified location.

To flash the firmware using TFTP settings:

- On Windows®:
  a. Copy the BMC firmware into a directory on the server.
  b. Run TFTP by launching the executable file tftpd32.exe.
  c. Navigate to **TFTP configuration>Settings,** and set Timeout to **4** seconds and Max Retransmit to **10.**
  d. Enter the **Base Directory** and **TFTP Server IP Address.** Base Directory is the path where the BMC firmware is residing. TFTP Server IP Address is the IP address of the TFTP server (for example, 10.141.38.157).
- On Linux:

a. Navigate to **Applications>Systems Settings>Server Settings>Services** and make sure that TFTP and xinetd are running.

b. Open the `/etc/xinetd.d/tftp` file and modify the parameter `server_args` to include `-T 15000000`. For example, `server_args = -c -s /tftpboot -T 15000000`.

c. If a firewall is enabled, disable it or modify the settings to allow the firewall to connect to the TFTP port. To change the firewall settings, navigate to **Applications>System Settings>Security Level,** and enter `69:udp` in the parameter of the other port.

To update the firmware, log in to LO100 as the administrator through the CLP interface, and issue the `load` command to upload and install the firmware from the map1/firmware directory.

1. Start a CLP session. To access CLP:

   a. Navigate to **Start>All Programs>Accessories>Command Prompt**.

   b. At the command prompt, enter `telnet <IP address>`.

2. At the CLP prompt, enter `cd map1/firmware`.

3. At the CLP prompt, enter `load -source <URI> -oemhpfiletype csr`

   where:

   - *<URI>* is the `//<tftp server IP>/<filename>` to be downloaded.
   - *<tftp server IP>* is the URL or IP address of the TFTP server containing the firmware.
   - *<filename>* is the file name of the image file (LdrImage.bin in this example).

   For example, enter `load -source //10.141.38.157/LdrImage.bin - oemhpfiletype csr`.

   The TFTP application might report an error in the early part of the firmware upload process, during the firmware image validation process. An error does not necessarily indicate failure of the firmware upload and does not prevent successful firmware uploads. A successful firmware upload typically takes several minutes. After the firmware upgrade process is complete, verify that the new version of the firmware is active.

   If the firmware upgrade process fails after sufficient time (at least 5 minutes), reboot the server, and verify that the previous version of the firmware is still active. Always reboot the server before retrying the firmware upgrade process.

   After installing the firmware, the IP address of the server might reset to the default value. You must locally reset the IP address to the desired address.

   NOTE: After using the `load` command LO100 will reset ending your CLP interface session. You must reconnect to the CLP interface.

   NOTE: When you use the CLP load command with TFTPD32, HP recommends using a 4-second timeout and 10 retries.

Using LO100

Using SSL

SSL is a protocol used to transmit private documents through the Internet and uses a private key or certificate to encrypt data transferred over the SSL connection. The Lights-Out 100 provides security for remote management in distributed IT environments by using an industry-standard encryption protocol for data traveling on unsecured networks.

SSL is available by installing the Lights-Out 100c Remote Management Card or purchasing the Lights-Out 100i Select Pack or the Lights-Out 100i Advanced Pack. For more information, see "LO100 optional features (on page 6)."

LO100 comes preinstalled with a certificate. To install a user-specific certificate, see the one-time "Importing a certificate (on page 51)" setup procedure.

If you cannot access the login page, you must verify the SSL encryption level of your browser is set to 128 bits. The SSL encryption level within the management processor is set to 128 bits and cannot be changed. The browser and management processor encryption levels must be the same.

To use the preinstalled certificate, enter `https://ipaddress` in the address line of the browser, which uses SSL-encrypted communication. Enter `http://ipaddress` to use non-SSL encrypted communication.

Using SSH

SSH is a telnet-like program for logging in to and executing commands on a remote machine, which includes security with authentication, encryption, and data integrity features. The Lights-Out 100 remote management processor can support simultaneous access from two SSH clients. After SSH is connected and authenticated, the command line interface is available. LO100 supports two simultaneous SSH connections.

SSH is available by installing the Lights-Out 100c Remote Management Card or purchasing the Lights-Out 100i Select Pack or the Lights-Out 100i Advanced Pack. For more information, see "LO100 optional features (on page 6)."

LO100 supports the SSH version 2 and the following client utilities:

- PuTTY 0.54 or later.
- OpenSSH

LO100 comes preinstalled with a certificate. To install a user-specific certificate, see the one-time "Importing a certificate (on page 51)" setup procedure.

Using the SSH utility

When using a SSH utility to connect to a server for the first time, the utility prompts you to accept the server public key, sometimes referred to as a host key. Accepting this key authorizes the utility to store a

copy of the public key in its own database. The utility recognizes the server when future connections are attempted by comparing the public key to the one stored in its database.

> **NOTE:** Logging in to an SSH session could take up to 90 seconds. Depending on the client used, you might not see on-screen activity during this time.

To access the remote management processor using SSH:

1. Open an SSH window.
2. When prompted, enter the IP address, login name, and password.

Using the PuTTY utility

PuTTY 0.54 is a terminal emulation product that includes support for telnet and the SSH protocol. PuTTY 0.54 is available for download from the Internet.

- To start a PuTTY session, double-click the PuTTY icon in the directory in which PuTTY is installed.
- To start a PuTTY session from the command line:
  - To start a connection to a server called host, enter:

    ```
    putty.exe [-ssh | -telnet | -rlogin | -raw] [user@]host
    ```
  - For telnet sessions, you can also enter the following alternative syntax:

    ```
    putty.exe telnet://host[:port]/
    ```
  - To start an existing saved session called session name, enter:

    ```
    putty.exe -load "session name"
    ```

When you press **Enter** using PuTTY versions earlier than 0.54, two line feeds might appear on a single line feed. To avoid this issue and for best results, HP recommends using version 0.54 or later.

Using the OpenSSH utility

OpenSSH is a free version of the SSH protocol available for download on the Internet.

To start an OpenSSH client in Linux, at the command prompt enter:

```
ssh -l loginname ipaddress/dns name
```

Using CLP

HP has worked with key industry partners within Distributed Management Task Force, Inc. to define an industry-standard set of commands. The SMASH suite will standardize manageability interfaces for servers. The Lights-Out 100 remote management processor implements the command set defined in the *Server Management Command Line Protocol Specification, 1.00 Draft*. The CLP replaces the simple CLI that was released previously and is no longer supported.

The management processor functionality accessible from the SMASH CLP is a low-bandwidth interface and provides similar functionality to the web interface. The CLP is designed for users who prefer a nongraphical interface. The CLP is accessible through the following methods:

- Telnet
- SSH connection
- Physical serial port

LO100 CLP supports two simultaneous SSH connections, two SSH connections and one telnet connection, or one SSH connection and two telnet connections. You cannot have more than two simultaneous SSH connections and up to three (telnet and SSH) connections at a time.

CLP syntax

The general syntax of CLP command is:

```
<verb> <target> <option> <property>
```

- **Verbs**—The following verbs are supported:
  - `cd`
  - `help`
  - `load`
  - `reset`
  - `set`
  - `show`
  - `start`
  - `stop`
  - `exit`
  - `version`
- **Target**—The default target is the `/`. The target can be changed by the `cd` command or by specifying a target on the command line.
- **Options**—The following options are valid:
  - `-help/-h`
  - `-all/-a`
- **Properties** are the attributes of the target that can be modified.
- **Output**—The output syntax is `text`.

The valid Boolean values for any command are `true` and `false`.

General notes

If the commands on the CLP command span more than one line, you cannot navigate between different lines.

Operating system-specific notes

- The Microsoft® Windows® 2000 telnet client does not support the Functions keys F1 through F12, Insert, Home, and End keys. These keys will not work in a Lights-Out 100 command line session.
- The Backspace key in the Lights-Out 100 CLP implementation is mapped to the value `0x8`. Some client operating systems, Novell Linux Desktop and Red Hat Enterprise Linux 4 Desktop, map the Backspace key to the value `0x7f`, which is used for the Delete key in the Windows® telnet client. The Backspace key will not work from a client from which it has value of `0x7f`. For the Linux clients, using the Home or the End key enables the Lights-Out 100 CLP service to remap the Backspace key to use the value `0x7f`, making the key functional.

In the Windows® PuTTY client, the Backspace key can be mapped to a value of `0x8` by changing the setting for Terminal Keyboard to Control-H.

Base commands

- The `help` command displays context-sensitive help.

  Entering help displays all the supported commands. Entering *<command> -help* displays the help message specific to that command.

  - `Help` for verbs

    Calling help for a verb returns the general syntax and usage associated with issuing that verb. Calling help for a verb that is not present in the current directory returns an `Unsupported Command` message. The following examples are all valid ways to call help for a verb.

    — `/./-> help show`

    Usage: `show [<target>][<options>][<properties>]`

    — `/./-> show -h`

    Usage: `show [<target>][<options>][<properties>]`

    — `/./-> show -help`

    Usage: `show [<target>][<options>][<properties>]`

    — `/./->`

  - `Help` for targets

    Calling help for a target returns any information about the target, and what it contains. You can call help for any target that is not contained in the current directory (`help map1` can be called from `system1`).

    — `/./-> system1 -h`

    ```
    Invalid command
    ```

    — `/./-> system1 -help`

    ```
    Invalid command
    ```

    — `/./-> help system1`

    ```
    Host System Directory
    ```

    — `/./-> help map1`

    ```
    Management Service Processor Directory
    ```

    — `/./-> cd system1`

    — `/./system1/-> help map1`

    ```
    Management Service Processor Directory
    ```

  - `Help` for properties

    Calling help for a property or any other option for which there is no help information returns an `Unsupported Command` or `Invalid command` message. For example:

    ```
    /./system1/-> show
    /./system1
    Targets
       oemhp_sensors
       oemhp_frus
       console1
       led1
    ```

```
Properties
   name=Hewlett-Packard
   enabledstate=enabled

Verbs
   cd
   version
   exit
   show
   reset
   start
   stop
   help

/./system1/-> help name
Unsupported Command

/./system1/-> help enabledstate
Unsupported Command

/./system1/-> help properties
Unsupported Command

/./system1/-> name -h
Invalid command

/./system1/->
```

- The `exit` command terminates the CLP session.
- The `cd` command sets the current default target. The context works similar to a directory path. The root context for the server and the starting point for a CLP system is /. (forward slash period). By changing the context, you can shorten commands.

  For example:

  - The `cd` command changes the directory.
  - The `cd ..` command moves up the tree one directory.
  - The `cd myfolder` command moves to the `myfolder` folder if `myfolder` is in the current directory.
- The `show` command displays values of a property or contents of a collection target. For example:

```
/./> show

/.
Targets
   system1
   map1
```

```
Properties
Verbs
   cd
   version
   exit
   show
   help
```

The first line of information returned by the `show` command is the current context. In the example, `/` is the current context. Following the context is a list of subtargets (Targets) and properties (Properties) applicable to the current context. The verbs section (Verbs) shows which commands are available in this context.

You can also specify the `show` command with an explicit or implicit context and a specific property. An explicit context is `/map1/firmware` and is not dependent on the current context. An implicit context assumes that the context specified is a child of the current context. If the current context is /map1, then a `show firmware` command displays the /map1/firmware data. If a property is not specified, then all properties are shown.

- The `load` command moves a binary image from a URL to the map. The `load` command takes a binary image from a specific source location (specified as a URL) and places the image at the specified target address. In a remote management processor implementation, the firmware downloads a full image file using TFTP from the specified location and programs flash with the image.

  In a remote management processor implementation, `/map1/firmware` is a valid target.

  The `load` command supports usage only with the following options.

  - `-source <location>`—This option must be specified.
  - `(h)elp`—This option appears on the command line. The command ignores all options and properties except `-output` (for terse or verbose output). These options are valid only for this command when the `-help` option is used.
  - `source <value>`—This option specifies the target from which the binary image is transferred. The value specified must be a valid URL. The format is `//tftpserverip/path/filename`. This option is required in the command line when you execute the `load` command unless you use `-help`. The file must be an uncompressed firmware image file that you create using the DOS ROMPAQ utility found on the Lights-Out 100 Firmware Upgrade Diskette Utility. You can download the utility from the HP website (http://www.hp.com/servers/lights-out).

    To create the uncompressed image file, enter the following command from DOS:

    `ROMPAQ /D` *<infile> <outfile>*

    where `<infile>` is the ROMPAQ firmware image file and `<outfile>` is the filename for the uncompressed binary image file.
  - `-examine`—This option validates command formats.

  The `load` command returns any status data on the first lines. After the status data appears, one of the following lines of text appears on the next line:

  - `<URL> transferred to <target address>` (if the file is transferred)
  - `<URL> not transferred` (if the file is not transferred)

  Example:

  ```
  load -source //192.168.2.1/pub/firmwareimage.bin -oemhpfiletype csr
  ```

```
//192.168.2.1/pub/firmwareimage.bin transferred to
/map1/firmware/firmwareimage
```

- The `reset` command cycles the target from enabled to disabled and then back to enabled.
- The `set` command assigns a specific value to a property or group of properties. The standard syntax for the `set` command is `set property = new value`.

  The `set` command is used to change any property (if applicable.) If the current directory does not contain the property you want to change, you must specify the target of the property before entering the property you want to change.
- The `start` command causes a target to change state to a higher run level.
- The `stop` command causes a target to change state to a lower run level.

  You can between a CLP and a console redirection session by entering `start` or `stop` in the directory, for example, the `/./system1/console1/->` directory.

  When using the `stop` command to switch to the CLP session, you must press the ESC key before using the `stop` command to return to the CLP session.
- The `version` command queries the version of the CLP implementation or other CLP elements. For example:

```
/./map1/-> version
Version 1.00

/./map1/-> cd firmware
/./map1/firmware/-> version
Version 1.00

/./map1/firmware/-> show
   /./map1/firmware
   Targets
   Properties
      fwversion=2.20
   Verbs
      cd
      version
      exit
      show
      reset
      load
      help
/./map1/firmware/-> show fwversion
fwversion=2.20

/./map1/firmware/-> fwversion
Invalid command

/./map1/firmware/->
```

Specific commands

CLP syntax for specific commands is found in the sections that also describe the functionality through the browser interface.

To turn on or off the server LED1 (UID):

1. Browse to the `/./system1/led1/->` directory.
2. Enter the following command:

   `set led1 enabledstate=enabled` or `disabled`

To view a license key:

1. Browse to the `/./map1/->` directory.
2. Enter the following command:
   `show`

To display the firmware version:

1. Browse to the `/./map1/firmware/->` directory.
2. Enter the following command:
   `show`

IPMI 2.0 support

LO100 supports the industry-standard IPMI 2.0. The IPMI specification defines standardized, abstracted interfaces that can be used for monitoring and control functions that are built in to the platform hardware.

In addition to supporting the mandatory commands for IPMI 2.0, the following additional IPMI 2.0 features are supported by LO100:

- Additional IPMI 2.0 commands
  - Get Channel Cipher Suites
  - Set/Get Channel Security Keys
  - Suspend/Resume Payload Encryption
- Payload types
  - IPMI Message
  - RMCP+ Open Session Request/Response
  - RAKP Message 1 / 2
  - RAKP Message 3 / 4
- Authentication algorithms
  - RAKP-none
  - RAKP-HMAC-SHA1
- Integrity algorithms
  - None
  - HMAC-SHA1-96
- Confidentiality algorithms
  - None

- AES-CBC-128

Logging in to LO100

You can log in to the remote management processor through a web browser ("Logging in through a web browser" on page 26) or through the CLP ("Logging in through the CLP" on page 26). If you are unsure of your DHCP IP address, refer to the "Configuring network access (on page 10)" section.

Logging in through a web browser

1. Browse to the IP address of the remote management processor to access the login screen.
2. Enter your user name and password. The default user name for the Administrator account is admin, and the default password is admin. The default user name for the Operator account is Operator, and the default password is Operator.

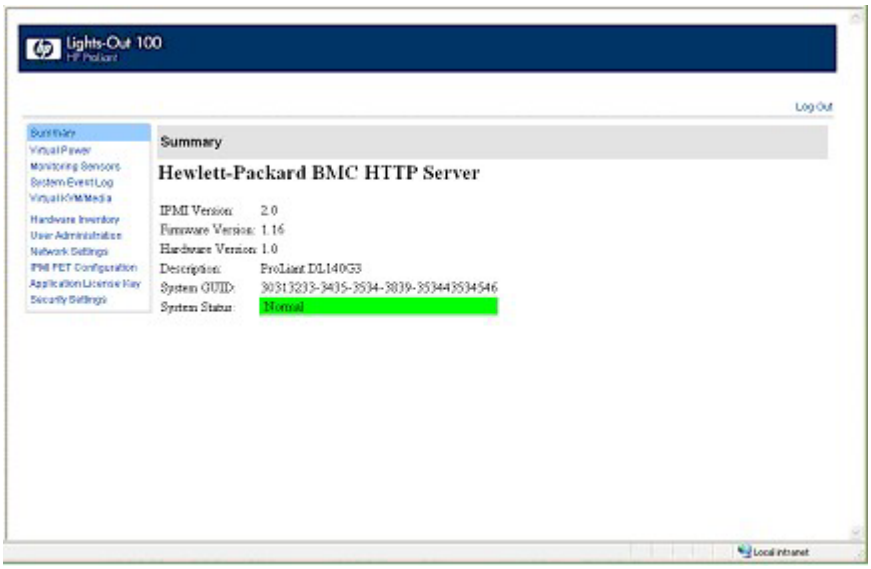
Enter Network Password
This secure Web Site (at xx.xxx.xxx.x) requires you to log on.
Please type the User Name and Password that you use for BMC.
User Name
admin
Password
Save this password in your password list
OK
Cancel

Logging in through the CLP

1. Establish a connection to the remote management processor by launching a telnet session or an SSH session.
2. Enter the user name at the login prompt. The default user name for the Administrator account is admin. The default user name for the Operator account is Operator.
3. Enter the password at the password prompt. The default password for the Administrator account is admin. The default password for the Operator account is Operator.
4. To exit the CLP and enter Console mode, enter the `exit` command at the command prompt.

Browser main menu options

Using a web browser, you can access all of the basic remote management capabilities of LO100. Not all of the features displayed and described in the guide are available on all systems. To verify which features are supported on your system, see "LO100 standard features (on page 6)" and "LO100 optional features (on page 6)" for more information.



Option	Description
Summary	Accesses or returns you to the main menu navigation bar
Virtual Power	Accesses system power and UID control options
Monitoring Sensors	Lists all sensor information, including type, name, status, reading, and PEF settings
System Event Log	Displays the system event log
Virtual KVM/Media	Accesses virtual media or the remote graphic console
Hardware Inventory	Displays system hardware information
User Administration	Accesses the user configuration screen
Network Settings	Accesses the network parameter settings screen
IMPI PET Configuration	Accesses the PET destinations and alert policy table
Application License Key	Displays the licensing screen
Security Settings	Accesses LO100 security, personal certificate and key installation options

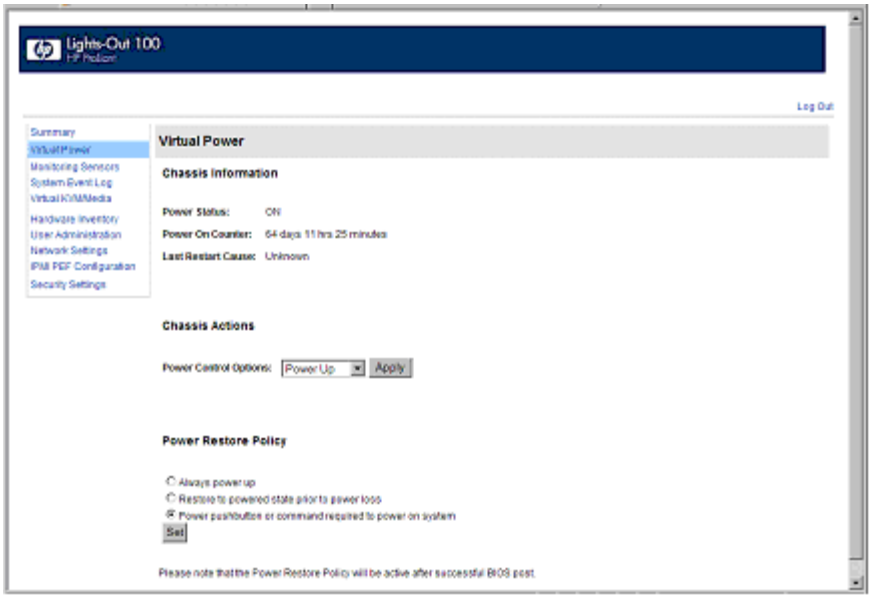
NOTE: The Virtual KVM / Media option is an advanced feature and not available on all systems. This link may appear as Virtual Media or not at all depending on your system implementation. To verify which features are supported on your system, see "LO100 standard features (on page 6)" and "LO100 optional features (on page 6)" for more information.

Controlling server power remotely

LO100 enables you to remotely operate the power button of a host server using a web browser or the CLP. LO100 virtual power support enables you to power on, power off, and power cycle the host server. This virtual power support operates independently of the state of the operating system.

Controlling server power from a browser

The Virtual Power screen displays current power status, how long the server has been powered on, and the reason for the last server restart. To display the Virtual Power screen, on the main menu navigation bar, click **Virtual Power.**



To modify Chassis Actions, select a Power Control Option in the Chassis Actions section, and then click **Apply.**

To identify the server in the rack and illuminate the UID (the LED on the front panel of the server), from the UID list, select the length of time for the UID to illuminate, and then click **Identify.**

> **NOTE:** The UID is not available on all LO100 servers. For more information, see your server user guide.

A restore policy controls how the system responds when power is connected to the server. To set a restore policy:

1. Select the Power Restore Policy by choosing one of the following options:
   - Always power up—Powers on the server immediately after power is supplied.
   - Restore to powered state prior to power loss—Powers on the system if the system was in the powered on state before a loss of power.
   - Power pushbutton or command required to power on system—Causes the server to wait for external action before powering on the system.
2. Click **Set.**

Controlling server power through the CLP

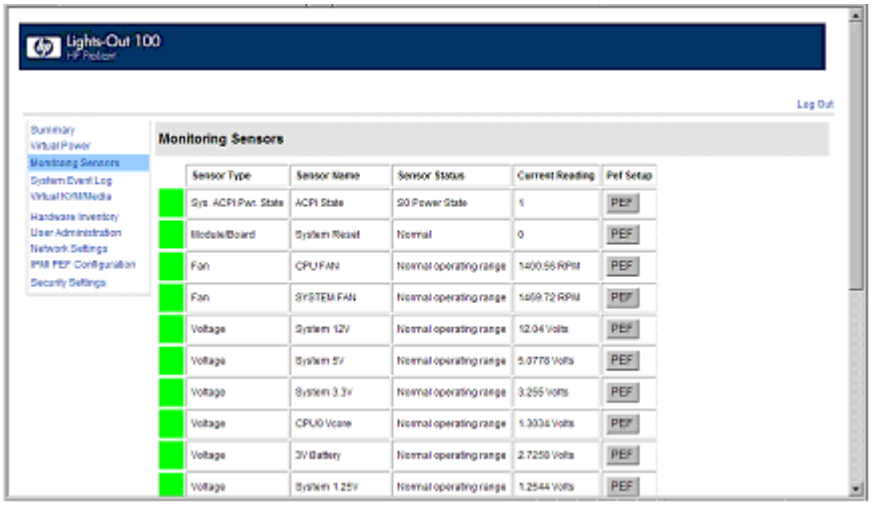
1. Log in to LO100 CLP as described in the "Logging in to LO100 (on page 26)" section.
2. Change to the system1 target by entering `cd system1`.
3. To power on the server, enter `start /system1`. For example:
   ```
   /./system1/> start /system1
   System1 started.
   ```
4. To power off the server, enter `stop /system1`. For example:
   ```
   /./system1/> stop /system1
   System1 stopped.
   ```
   The `-force` option can also be used with the `stop` command. This option forces the implementation to stop the target, ignoring any policy that might cause the implementation to normally not execute the command. In remote management processor implementation, this process is equivalent to a hard power down.
5. To reset the server, enter `reset /system1`. For example:
   ```
   /./system1/> reset
   System1 reset.
   ```

Monitoring sensors

LO100 provides operating system-independent remote monitoring of the current status of major sensors of a target server including system temperature, fans, and voltage. You can view the data for this feature on the Monitoring Sensors Page through a web browser or through the BIOS Setup Utility.

Viewing sensor data from a web browser

The Monitoring Sensors screen displays a snapshot of the temperature, fans, and voltage sensor data, including sensor type, name, status, and current reading. To access this page from a web browser, on the main menu navigation bar, click **Monitoring Sensor.**



To update the display, click the **Refresh** button. To view or add a PEF action, click **PEF.** For more information, see "Platform Event Filtering configuration (on page 30)."

Viewing sensor data from the BIOS Setup Utility

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Choose one of these options:
   - On HP ProLiant ML110 G5 and ProLiant ML150 G5 servers:
     i. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     ii. Scroll to Realtime Sensor Data by pressing the down arrow (↓) key. Press the **Enter** key.
   - On HP ProLiant ML115 G5 servers:
     i. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     ii. Scroll to the Hardware Health Information menu by pressing the down arrow (↓) key. Press the **Enter** key.
   - On ProLiant DL120 G5 servers:
     i. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
     ii. Scroll to Realtime Sensor Data by pressing the down arrow (↓) key. Press the **Enter** key.
   - On HP ProLiant DL160 G5, ProLiant DL165 G5, ProLiant DL180 G5, and ProLiant DL185 G5 servers:
     i. Press the down arrow (↓) key to scroll to IPMI Configuration. Press the **Enter** key.
     ii. Scroll to the Hardware Health Information menu by pressing the down arrow (↓) key. Press the **Enter** key.

The `Loading data. Please wait` message appears. After this message disappears, the Temperature and Voltage sensor data appears. This data is real-time data and is updated on a periodic basis.

Platform event filtering configuration

The PEF Configuration screen enables you to configure LO100 to take selected actions on received or internally generated event messages. These actions include powering down the system, resetting the system, and triggering the generation of an alert.

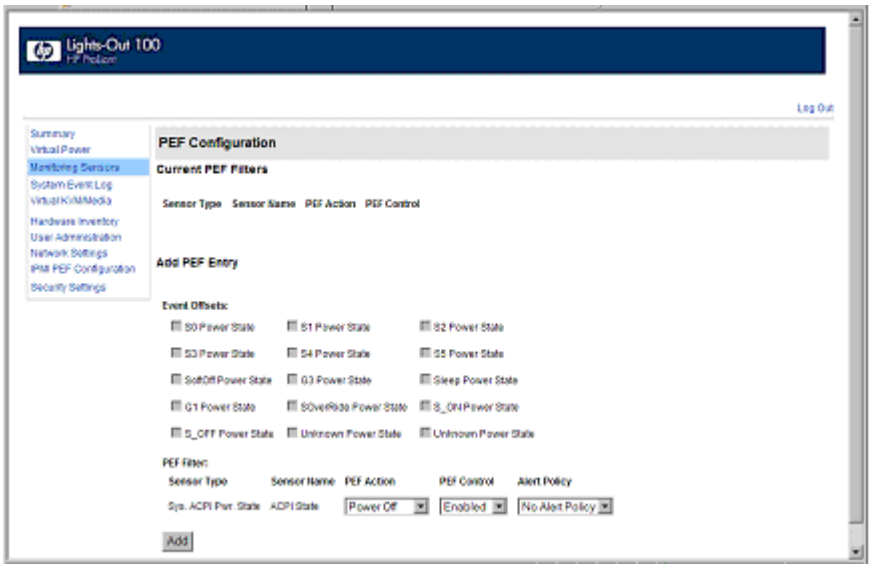
To enable PEF functionality you must issue the following commands in the CLP:

```
cd map1
oemhp i 20 10 D0 18 00 12 01 03 D2
oemhp i 20 10 D0 18 00 12 02 3F 95
```

To configure a PEF for a particular sensor, click the **PEF** button to the far right of that sensor on the Monitoring Sensors screen. The PEF button adjacent to each sensor opens a PEF Configuration page for that sensor.

The PEF Configuration screen contains two sections: Current PEF Entries and Add PEF Entry. The Current PEF Entries section includes Sensor Type, Sensor Name, PEF Action, and PEF Control information. The Add PEF Entry section enables you set an action.

Initially, there are no entries are in the Current PEF Entries section because no PEFs are defined. When PEF entries are defined, the PEF Control field is active and enables you to set the individual entries to enabled, disabled, or deleted.



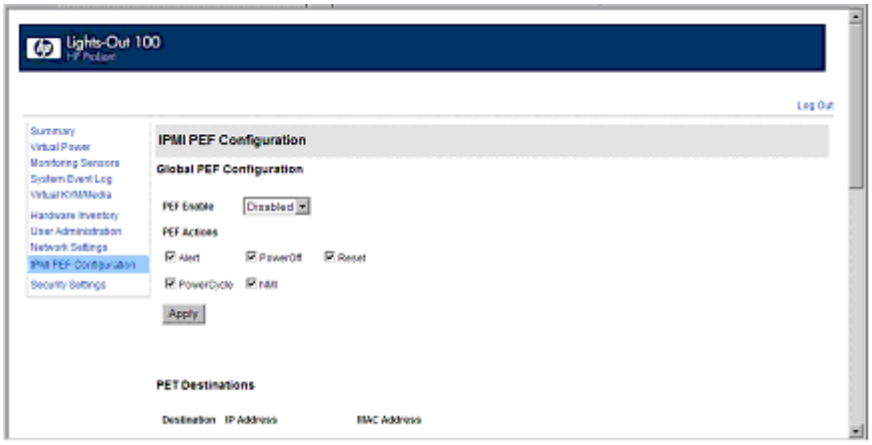
To configure an action (PEF entry), select the desired Event Offsets, select the desired PEF Action settings, and then click **Add.**

- Event Offsets—Are trip points (movements across thresholds) that define what type of sensor event triggers an action. The information in the Events Offsets section varies with the type of sensor. Not all options are available for all sensors. You can select any of the available options.
- PEF Action—Displays the same information for all sensors:
  - Sensor Type—Displays the type of sensor selected.
  - Sensor Name—Displays the name of the sensor.
  - PEF Action—Enables you to select from Power Off, Power Cycle, Hard Reset, and Send Alert (requires a systems management console supporting IPMI 1.5 or later).
  - PEF Control—Enables or disables the sensor.
  - Alert Policy (list adjacent to the Add button)—Enables you to select an alert policy (if defined). Alert policies are defined on the PET Configuration screen. For information, see "Platform event trap configuration (on page 32)."

    If alert policies are not defined (default), the Alert Policy list displays No Alert Policy. The Alert Policy list populates after alert policies are defined and configured. After configuring your alert policies, you can select from the defined alert policies for this sensor and PEF.
  - Add—Adds the new entry to the PEF Current Entry table at the top of the page.

Platform event trap configuration

The IPMI PEF Configuration screen enables you to set an alarm or specified condition originating on the server to alert an IPMI 2.0-supported systems management console. To display the IPMI PEF Configuration screen, on the main menu navigation bar, click **IPMI PEF Configuration.**



The Global PEF Enable section enables you to set a global PEF action. To create a global PEF action, select **Enabled** in the PEF Enable box, select the PEF action, and then click **Apply.**

The PET Destinations section indicates where LO100 sends the PET (if configured.) This section has up to eight entries specifying IP and MAC addresses. In the PET Destinations section, enter either an IP address or a MAC address and then click **Apply.** If both the MAC and an IP address are entered, the IP address is used.

To set a policy:

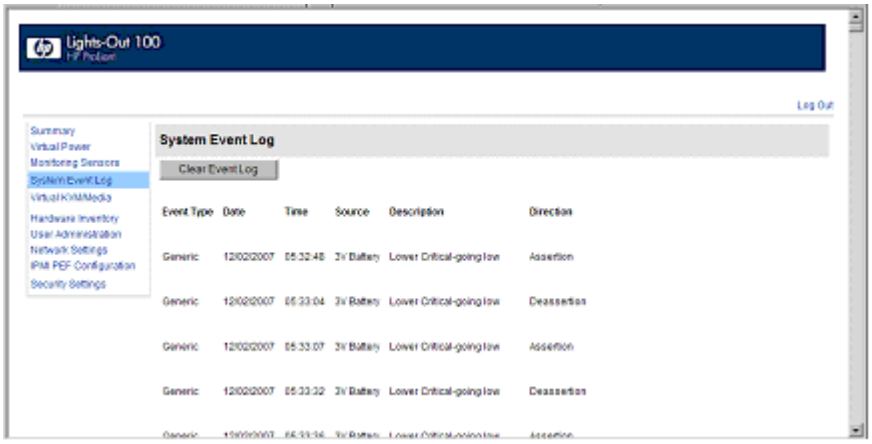
1. Select the Policy Enable state and then enter the Policy Number and Destination Selector information.
   - Policy Enable—Enables you to selectively enable and disable trap forwarding.
   - Policy Number—Enables you to select a policy that will be used in PEF configuration.
   - Destination Selector—Specifies where to send the PET trap from the destinations defined in the PET Destinations section.
2. Click **Apply.**

Using the system event log

LO100 captures and stores the IPMI event log for access through a browser, CLP, BIOS Setup Utility, and RBSU even when the server is not operational. The system event log lists a short description of each system event. Recorded events include abnormal temperature, fan and voltage events, system resets, system power loss, user login, and unsuccessful login attempts.

Accessing the system event log from a web browser

The System Event Log screen displays a brief description of the event, including event type, date, time, source, description, and direction.



To access the System Event Log from a web browser, on the main menu navigation bar, click **System Event Log.** To clear the system event log, click **Clear Event Log.**

Accessing the system event log from the CLP

1. Log in to the CLP as described in the "Logging in to LO100 (on page 26)" section.
2. Enter `cd /./system1/log1`
3. Enter `show` to display the total number of system event records.
4. Enter `show record<n>` to display the details of a specific record. For example:

```
/system1/log1/record1
Targets
Properties
   number=1
   date=12/20/2004
   time=15:22:05
   sensordescription= Backplane +12V
   eventdescription= Upper Critical-going high
   eventdirection=Assertion
Verbs
   cd
   version
   exit
   show
   reset
   oemhp
   help
```

Accessing the system event log from the BIOS Setup Utility

1. Press the **F10** key during POST to enter the BIOS Setup Utility.

2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. Choose one of these options:
   - On ProLiant ML110 G4 and ProLiant ML150 G3 servers, scroll to the bottom of the IPMI page. The available options include System Event Log and System Event Log (list mode).
   - On ProLiant ML115 G1 servers:

   a. Press the down arrow (↓) key to scroll to the SEL Configuration menu. Press the **Enter** key.

   b. Press the down arrow (↓) key to scroll to the following available setup options:

      — View BMC System Event Log

      — Clear BMC System Event Log.

   - On ProLiant DL140 G3 and ProLiant DL145 G3 servers:

   a. Press the down arrow (↓) key to scroll to the System Event Log submenu. Press the **Enter** key.

   b. Press the down arrow (↓) key to scroll to the following available setup items. The available options include Clear System Event Log and View System Event Log.
5. Press the **Enter** key to view the highlighted setup item.
6. Press the **Esc** key to return to the previous screen, or press the **F10** key to save the changes and exit Setup.

Using Virtual KVM

The Virtual KVM feature of LO100 is a remote graphic console that turns a supported browser into a virtual desktop and provides full control over the display, keyboard, and mouse of the host server. The operating system-independent console supports graphic modes that display remote host server activities, including shutdown and startup operations.

Virtual KVM is an advanced feature available by installing the Lights-Out 100c Remote Management Card or purchasing the Lights-Out 100i Select Pack or the Lights-Out 100i Advanced Pack. For more information, see the section, "LO100 optional features (on page 6)."

NOTE: This functionality is only available on systems using a dedicated LO100 NIC.

When connecting to the Virtual KVM applet for the first time, the applet reports an error. To clear the error and connect to the Virtual KVM applet, close your browser session, and then reconnect to the Virtual KVM applet.

The Virtual KVM applet is not compatible with standard VNC clients and does not implement standard VNC protocols. You must use the supplied Java™ applet to connect to the server. The Virtual KVM applet cannot pass the F10 key sequence to the target system. To work around this issue, use the virtual keyboard on the remote server to transmit the F10 key.

If shared NIC mode is enabled through the BIOS Setup Utility, the KVMS option (link) does not appear or function on HP ProLiant ML110 servers. If the HP Lights-Out 100c Remote Management Card is installed, you must use the dedicated NIC port on the HP Lights-Out 100c Remote Management Card.

The remote graphic console requires JVM version 1.4.2 or later on the client system. To download the recommended JVM for your system configuration, refer to the HP website (http://www.hp.com/servers/manage/jvm).

To start the LO100 remote graphic console using a web browser:

1. Log in to LO100.
2. Click **Virtual KVM / Media.** The LO100 remote graphic console window appears.

> **NOTE:** The Virtual KVM / Media option is an advanced feature and not available on all systems. This link may appear as Virtual Media or not at all depending on your system implementation. To verify which features are supported on your system, see "LO100 standard features (on page 6)" and "LO100 optional features (on page 6)" for more information.

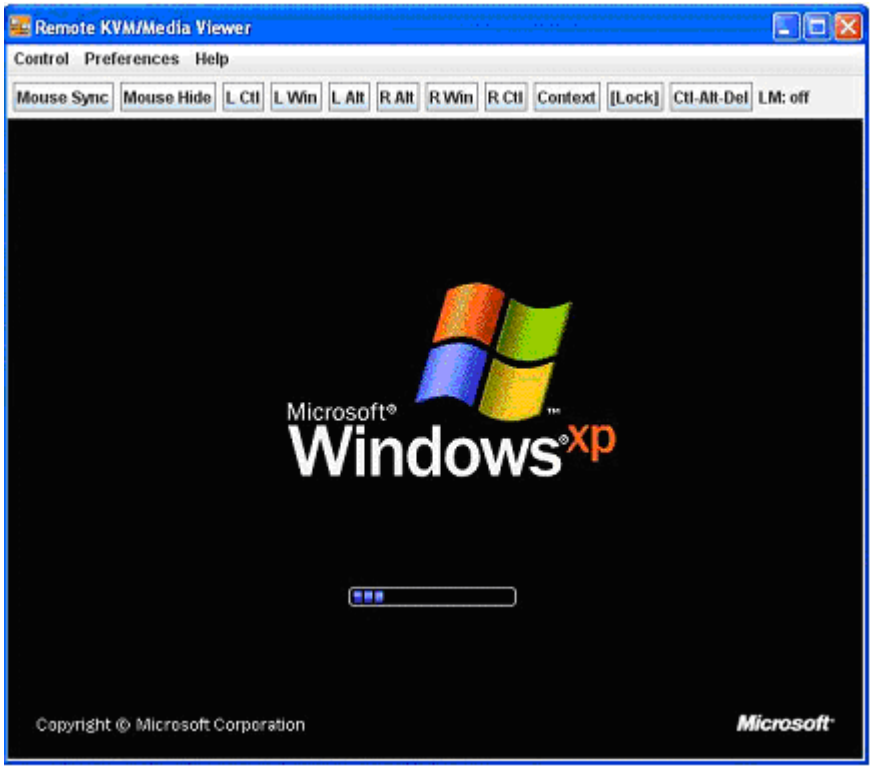
3. To take full control of the system, click **OK**, or to access the system in a view-only mode, click **Cancel.**

Before using the mouse in LO100 remote graphic console, HP recommends synchronizing your local mouse pointer and the remote mouse pointer. For more information, see "Mouse synchronization (on page 37)."

Using the remote graphic console

The Remote KVM/Media Viewer displays a virtual desktop and provides full control over the display, keyboard, and mouse of the host server. There are three different menus in the remote graphic console menu bar: Control, Preferences, and Help.

- Control—Enables you to access virtual media devices and the virtual keyboard, refresh the screen, and exit the client.
- Preferences—Enables you to set mouse, keyboard, and logging options. For more information, see "Remote graphic console settings (on page 37)."
- Help—Displays an About box, which specifies the LO100 remote graphic console version, build date, and time.



The Control menu of the remote graphic console has several different options.

- Virtual Media—Displays the Virtual Media Devices page. The Virtual Media Devices page displays all accessible media drives of the storage server. Supported devices are CD-ROM, DVD-ROM floppy disk, and mass storage devices. For more information, see "Using Virtual Media (on page 39)."
- Virtual Keyboard—Opens a virtual keyboard enabling you to change the language of the virtual keyboard. To change keyboard settings, see "Remote graphic console settings (on page 37)."

The Lock button on the Virtual Keyboard is added to each language. If you click the Lock button, special keys that you press, such as Shift, Alt, Ctrl, context and Windows® remain in a pressed status. To release the special keys, click the **Lock** button and then click the pressed special keys.

> **NOTE:** When entering any ESC key sequences, extra characters might be buffered, causing the remote side to receive function key presses incorrectly. To avoid this issue and perform function key or alternate key sequences, press and hold the **ESC** key, release it, and then press the other key sequence.

- Turn local monitor on—Powers on the local monitor.
- Turn local monitor off—Powers down the local monitor.

  When the Turn local monitor off setting is enabled, the local monitor (if connected) appears black (blank/off) when Virtual KVM is invoked. This is a security feature. The local monitor returns to normal operation after closing Virtual KVM.

  The Virtual KVM applet is not compatible with standard VNC clients and does not implement standard VNC protocols. You must use the supplied Java™ applet to connect to the server. The Virtual KVM applet cannot pass the F10 key sequence to the target system. To work around this issue, use the virtual keyboard on the remote server to transmit the F10 key.
- The KVMS option (link) does not appear or function on HP ProLiant servers using the HP Lights-Out 100c Remote Management Card, if shared NIC mode is enabled through the BIOS Setup Utility. If the HP Lights-Out 100c Remote Management Card is installed, you must use the dedicated NIC port on the HP Lights-Out 100c Remote Management Card.
- Refresh Screen—Updates the information on the screen.
- Take Full Control—Enables you to take control of the remote console if you are currently in view-only mode. Only one remote console user can control the remote console at a time. Clicking Take Full Control displays a dialog box that prompts you to click OK to take full control of the system or click Cancel to access the system in a view-only mode.
- Disconnect Session—Disconnects the selected user session.
- Relinquish Full Control—Releases control of the session and remains in a view-only status.
- Exit—Closes the remote session.

NOTE: The Keyboard, Refresh Screen, Take Full Control, Disconnect Session, and Relinquish Full Control menu options are an advanced feature available with full Virtual KVM access only.

Remote graphic console settings

To change the mouse, keyboard, and logging settings, select **Preferences.**

- The Mouse tab enables you to set the Mouse mode. To display the Mouse Mode list, select **Mouse,** which has the following options:
  - Hide Mode (Relative) causes the LO100 remote graphic console to change to Relative mode.

    Relative mouse mode hides the local mouse cursor. Use Hide Mode Relative if you are running a DOS-based program and the mouse is not tracking correctly.

    When using Hide Mode, the local mouse is inaccessible. To access the local mouse (normal mode), press **Ctrl+Alt+0.**
  - Absolute Mode causes the LO100 remote graphic console to send raw *x* and *y* coordinates to the server.
  - Relative Mode sends the LO100 remote graphic console relative mouse position coordinates (+/- previous mouse pointer position) to the server. This mode is the default for Linux and Windows®.
- The Keyboard tab enables you to set the language of the virtual keyboard and the type of connection you are using. English is the default language. You can change the language of the virtual keyboard by selecting one of the 12 languages.

  The remote side server and local side server (the LO100 remote graphic console) must use the same language for the virtual keyboard to function properly.
- The Logging tab enables you to view log messages in a Java™ console.

  Global Logging is disabled by default. If you enable this option, you can view log messages in a Java™ console.

  Do not run the console longer than 2 hours. The console uses all available memory and might cause the LO100 remote graphic console and the user web browser to crash. You should periodically clear the event log to prevent a slow connection or possible crash.

  To record all log messages to the console from the Logging list, select **Console.** To check log messages in the Java™ console window, from the list on the Tools menu of Internet Explorer menu bar, select **Sun Java Console.**

  To record all log messages to a file, select **Log File** from the Logging list, enabling the Console Log File textbox. To select a file in which log messages will be stored, click the **Browse** button, or enter the fully qualified file name of the selected file in the textbox. To send log messages to both a file of your choice and to the Java™ console, select **Console and Log File.**

Mouse synchronization

To synchronize the local mouse pointer and the server mouse pointer, bring the local mouse to the top left corner to attract the server mouse pointer to the top left corner. Both pointers become synchronized when they overlap as one pointer.

For mouse synchronization to work correctly, you must change the Enhance Mouse pointer and Hardware Acceleration options on the remote machine (server side) using the LO100 remote graphic console.

For Windows® operating systems, perform the following steps:

To change the Enhance Mouse pointer option:

1. Select **Start>Control Panel.**
2. Double-click **Mouse.** The Mouse Properties window appears.
3. Select **Pointer Options**.
4. In the Pointer Options window:
   a. Set the Pointer speed bar in the middle.
   b. Be sure the Enhance pointer precision option is not selected.

To change the Hardware Acceleration option:

1. Right-click the desktop screen
2. Select **Properties.** The Display Properties window appears.
3. Click **Settings>Advanced.** The video card and monitor properties window appears.
4. Click **Troubleshoot.**
5. Set hardware acceleration to **None** to disable cursor and bitmap accelerations (one scale or option below Full).
6. Click **Apply.**
7. Click **OK** to exit the Display Properties window.

For Linux operating systems, perform the following steps:

- For SLES 9:
  a. Determine which mouse device is the remote console mouse using the `xsetpointer -l` command to list all mouse devices.
  b. Determine which mouse to modify by cross-referencing the output of xsetpointer with the X configuration (either `/etc/X11/XF86Config` or `/etc/X11/xorg.conf`.)
  c. Select the remote console mouse as the mouse to modify. For example:
     ```
     xsetpointer Mouse[2]
     ```
  d. Set the acceleration parameters. For example:
     ```
     xset m 1/1 1
     ```
- For Red Hat Enterprise Linux, set the acceleration parameters using:
  ```
  xset m 1/1 1
  ```

System buttons

On the virtual keyboard, there are eight different system buttons: LCtrl, LWin, LAlt, RAlt, RWin, RCtrl, Context, and [Lock]. These buttons can be used as virtual keys and are similar to the keys the physical keyboard of your local machine.

For example, when you press the **Ctrl+Alt+Del** keys on the physical keyboard, the Task Manager of your local machine appears in addition to the task manager on the server, or the key combination unlocks the server for login. To display the Task Manager of the remote server by pressing similar virtual keys, on the LO 100 remote graphic console window, click LCtrl click LAlt, and then press the Del key on your physical keyboard. Using this key combination displays the LO100 remote graphic console Task Manager. You can use any combination of virtual and physical Alt, Ctrl, and Del keys.

- Lock and special buttons, when pressed, remain in a pressed state until released. To release special buttons, click **[Lock],** and press the system buttons.

- Selecting or pairing LCtrl and RCtrl, LAlt and RAlt, LWin and RWin function as they would on an English language keyboard. However, they might function differently on keyboards of other languages.
- Clicking **Context** is equivalent to right-clicking the LO100 remote graphic console window.

Using Virtual Media

LO100 Virtual Media enables you to add, browse, remove, and share media devices and refresh the displayed virtual media devices list. LO100 Virtual Media is an advanced feature available by installing the Lights-Out 100c Remote Management Card or purchasing the Lights-Out 100i Select Pack or the Lights-Out 100i Advanced Pack. For more information, see the section, "LO100 optional features (on page 6)."

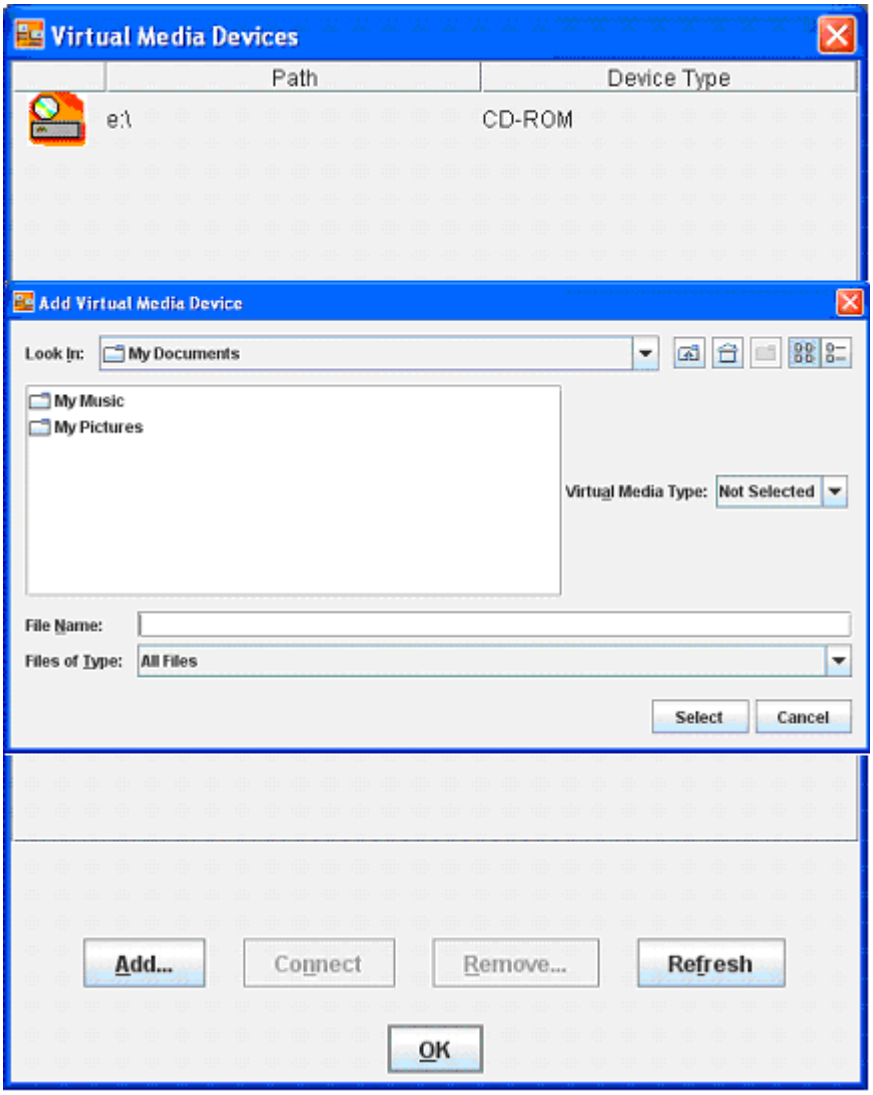
To access LO100 Virtual Media:

1. Click **Virtual KVM / Media** or **Virtual Media** (depending on your system implementation.) The Virtual KVM screen appears.
2. On the Virtual KVM menu, select **Storage.** The Storage Devices window appears and has the following options:
   - Clicking **Add** adds a new virtual media device to the storage devices list. See "Adding a virtual media device (on page 40)" for more information.
   - Clicking **Connect** shares the selected device. See "Shared virtual media devices (on page 41)" for more information. Only one device can be shared at one time.
   - Selecting a device and clicking **Remove** removes devices from the virtual media devices list.
   - Clicking **Browse** enables you to change the selected device path to another path.
   - Clicking **Refresh** rescans and displays the current devices on your machine.

A CD-ROM, DVD-ROM, or ISO image mounted through the Virtual KVM or Virtual Media applet functions and appears (in boot order) the same as a locally mounted media device.

Adding a virtual media device

The LO100 virtual media option provides you with a virtual media drive, which can direct a remote host server to boot and use standard media from anywhere on the network. Virtual media devices are available while the host system boots.



To add a new virtual media device, click **Add** on the Virtual Media Devices page. The Add Virtual Media Devices window appears. This window has the following options:

- The Look In list enables you to change your directory or drive.
- The Virtual Media Type list enables you to specify the file type that you want to share. You must declare a Virtual Media Type before LO100 recognizes they type of device it is sharing.
- The File Name textbox is the shared name of the device or images. See "Shared virtual media devices (on page 41)". There must be a disk in the device. If a disk is not present the `Invalid file or directory` message appears. If you are sharing a device, enter the Device Letter and a colon (:). Adding the colon distinguishes a device from a file.
- Select a value from the Files of Type list to select the files you want to share.

Shared virtual media devices

You can share a virtual media device from the Storage Devices window. Only one device may be shared at a time.

To share a virtual media device, do the following:

1. On the Virtual KVM menu, select **Storage.** The Storage Devices window appears.
2. Click **Add.** A dialog box appears, enabling you to specify which device you would like to share.
3. In the File Name field, enter either the file name or the drive you want to share. If you are sharing a drive, enter a colon (:) after the drive letter.
4. In the Storage Type dropdown list, select the storage type that matches the selected resource and click **Select.**

   You must have valid media in the drive if a removable media device type is selected. The selected device displays in the dialog box.
5. Select the device and click **Connect.** A message box appears, indicating either the device has been successfully connected or a problem has occurred.
6. Click **OK** to close the Storage Device window.

To remove a shared virtual media device, do the following:

Before removing a shared device, verify the device is safe to remove. If necessary, perform any required steps necessary to ensure the safe removal of removable media devices on the server.

1. On the Virtual KVM menu, select **Storage.** The Storage Devices window appears, displaying all previously added devices currently available.
2. Select the device you want to remove and click **Remove.** A dialog box appears, indicating that the device has been successfully disconnected.
3. Click **OK** to close the Storage Device window.

Accessing the remote console through telnet

You can access the remote console through either the BIOS console text-redirection functionality or a Windows Server® 2003 text-based console. Only one Remote Console window can be open at a time.

To start a remote console session, press the **Esc+Q** keys. To end a remote console session and return to the CLP press the **Esc+(** keys.

> **NOTE:** When entering any ESC key sequences, extra characters might be buffered, causing the remote side to receive function key presses incorrectly. To avoid this issue and perform function key or alternate key sequences, press and hold the **ESC** key, release it, and then press the other key sequence.

To change the timeout settings for telnet and for the remote console use Linux raw IPMI commands or an `oemhp` command through telnet. The following examples disable timeout:

- Linux IPMI tool Raw command example:

  ```
  ipmitool raw 0x0c 0x01 0x02 0xf6 0x00 0x00
  ```
- Disabling the security timeout using telnet example:

  ```
  oemhp i 20 30 b0 18 00 01 02 f6 00 00 ef
  ```

  The expected response is:

```
18 34 B4 20 00 01 00 DF  .4......
```

NOTE: These commands only work in firmware versions 2.21 or later.

Redirecting BIOS console text through telnet

LO100 BIOS console text redirection enables you to view the entire boot process remotely and make changes in the BIOS Setup Utility from a remote computer. This tool is valuable in troubleshooting and managing servers remotely.

To configure the BIOS Setup Utility on the target system:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Choose one of these options:
   - On ProLiant ML110 G4 servers, press the down arrow (↓) key to scroll down to the Console Redirection option, and press the **Enter** key. Verify the following settings:
     - EMS Support (SPCR)—Enabled
     - Serial Port Address—COM A
     - Baud Rate—115.2k
     - Console Type—VT100/PC
     - Continue C.R. after POST—Off
   - On ProLiant ML115 G1 servers, press the down arrow (↓) key to scroll down to the Console Redirection option, and press the **Enter** key. Verify the following settings:
     - Console Redirection—Enabled
     - EMS Support (SPCR)—Enabled
     - Serial Port Mode—09600 8,n,1
     - Flow Control—None
     - Redirection After BIOS POST—Always
     - Terminal Type—VT100
     - Sredir Memory Display Delay—No Delay
   - On ProLiant DL140 G3 servers, press the down arrow (↓) key to scroll down to the Console Redirection option, and press the **Enter** key. Verify the following settings:
     - EMS console—Enabled
     - Baud Rate—115.2k
     - Console Type—VT100+
     - Flow Control—None
     - Continue C.R. after POST—On
   - On ProLiant DL145 G3 servers, press the down arrow (↓) key to scroll down to the Console Redirection option, and press the **Enter** key. Verify the following settings:
     - Com Port Address—Disabled

- Baud Rate—115.2k
- Console Type—vt100 plus
- Flow Control—None
- Console Connection—Direct
- Continue C.R. after POST—On
- # of video pages to support—1

- On ProLiant ML150 G3 servers, press the down arrow (↓) key to scroll down to the Console Redirection option, and press the **Enter** key. Verify the following settings:
  - Console Redirection—Enabled
  - Baud Rate—115.2K
  - Terminal Type—VT100+
  - Flow Control—None
  - Redirection after BIOS POST—On

4. Press the **Esc** key to return to the previous screen.
5. Scroll to the I/O Device Configuration option, and press the **Enter** key.
6. Verify that Serial Port is set to Shared.
7. Follow the instructions in the "Network settings (on page 48)" section to set or obtain a valid IP address.
8. Press the **F10** key to save and exit.

After completing the console redirection process, you can view the boot process remotely from a client PC through an established telnet session to the IP address of LO100. See your operating system documentation for instructions on establishing telnet sessions.

To redirect the console to the telnet session and view the boot process, press the **Esc+Q** keys in the telnet session during server boot. If you reset the server using the telnet connection and press the **Esc+Q** keys, the boot process might not appear immediately. The boot process appears after the server resets. You can end the session by pressing the **Esc+(** keys.

NOTE: If you encounter problems logging in to the remote console, be aware that some telnet programs might require you to enable their `send line feed at end of line` option. If the remote console does not respond to the Enter key, try setting this option in your telnet program.

NOTE: You must follow the instructions in the "Network settings (on page 48)" section to configure the network access properly.

Redirecting a Linux console

In the remote console and servers with the Linux operating system, you can enable a remote login on ttyS0 by making the following changes to the BIOS Setup Utility and boot documents.

NOTE: The actual steps will vary depending on your version of Linux.

1. Using the BIOS Setup utility, verify your system configuration by choosing one of these options:

- On ProLiant ML110 G4 servers, verify or change the following settings:

  Configure Console Redirection

  - Console Redirection—Enabled
  - EMC Support (SPCR)—Enabled
  - Flow Control—None
  - Redirection After BIOS POST—Always
  - Terminal Type—VT100
  - Sredir Memory Display Delay—No Delay

  I/O Device Configuration—Configure IO Port

  - Serial Port 1 Address—3F8/IRQ4
- On ProLiant ML115 G1 servers, verify or change the following settings:

  Configure Console Redirection

  - Console Redirection—Enabled
  - EMS Support (SPCR)—Enabled
  - Flow Control—None
  - Redirection After BIOS POST—Always
  - Terminal Type—VT100
  - Sredir Memory Display Delay—No Delay

  I/O Device Configuration-Configure IO Port

  - Serial Port 1 Address—3F8/IRQ4
- On ProLiant DL140 G3 and ProLiant DL145 G3 servers, verify or change the following settings:

  Console Redirection

  - Console Redirection—Enabled
  - EMS Console—Enabled
  - Baud Rate—115.2K
  - Console Type—VT100+
  - Flow Control—None
  - Continue C.R. after POST—Enabled

  I/O Device

  - Serial Port Mode—BMC
  - Serial Port A—Enabled
  - Base I/O address—3F8
  - Interrupt—IRQ 4
- On ProLiant ML150 G3 servers, verify or change the following settings:

  Console Redirection

  - BIOS Serial console—Enabled
  - EMC Support (SPCR)—Enabled

- Baud Rate—115.2K
- Console Type—VT100
- Continue C.R. after POST—On

I/O Device Configuration

- Serial Port A—Enabled
- Base I/O address—3F8
- Interrupt—IRQ 4

2. In the /boot/grub/menu.lst file, append the following to the kernel startup line:

   `console=ttyS0 115200`

   Comment out the line `GRAPHICAL DISPLAY LINE`

   `# splashimage=(hd0,0)/grub/splash.xpm.gz`

3. Add an entry to allow serial console login in /etc/inittab. For example:
   `S0:12345:respawn:/sbin/agetty -L 115200 ttyS0 vt102`
4. In /etc/securetty enable root access to ttyS0 by adding `ttyS0`.
5. In /etc/sysconfig/kudzu, set kudzu to not perform serial port probing during boot. For example:
   `SAFE=yes`
6. After modifying and saving the previous files, reboot the server. You can now log in to the operating system through remote console.

After POST, in the remote console, the server prompts you with a login. Enter a valid login and use the server as you normally would. Use the ESC+Q keys to start remote console through the telnet and the ESC+(keys to exit the remote console in telnet.

Microsoft Windows EMS management

Microsoft® Windows Server™ 2003 provides text-based console access. You can connect a notebook to LO100 to perform basic management tasks on the target system. The Windows® EMS Console, if enabled, displays the processes that are running and enables administrators to halt processes. This capability is important in cases in which video, device drivers, or other operating system features have prevented normal operation and normal corrective actions.

To enable Windows® EMS management on the target system:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the **Advanced>Console Redirection** menu.
3. Choose one of these options:
   - On ProLiant ML110 G4, ProLiant DL140 G3, ProLiant DL145 G3, and ProLiant ML150 G3 servers, press the down arrow (↓) key to scroll down to the EMS Console option, and press the **Enter** key to access the submenu. Verify the following settings:
     - Console Redirection—Enabled
     - Baud Rate—115.2K
     - Terminal Type—VT100+
     - Flow Control—None
     - Redirection after BIOS POST—On

- On ProLiant ML115 G1 servers, press the down arrow (↓) key to scroll down to the Console Redirection option, and press the Enter key. Verify the following settings:
  - Console Redirection—Enabled
  - EMS Support (SPCR)—Enabled
  - Serial Port Mode—09600 8,n,1
  - Flow Control—None
  - Redirection After BIOS POST—Always
  - Terminal Type—VT100
  - Sredir Memory Display Delay—No Delay

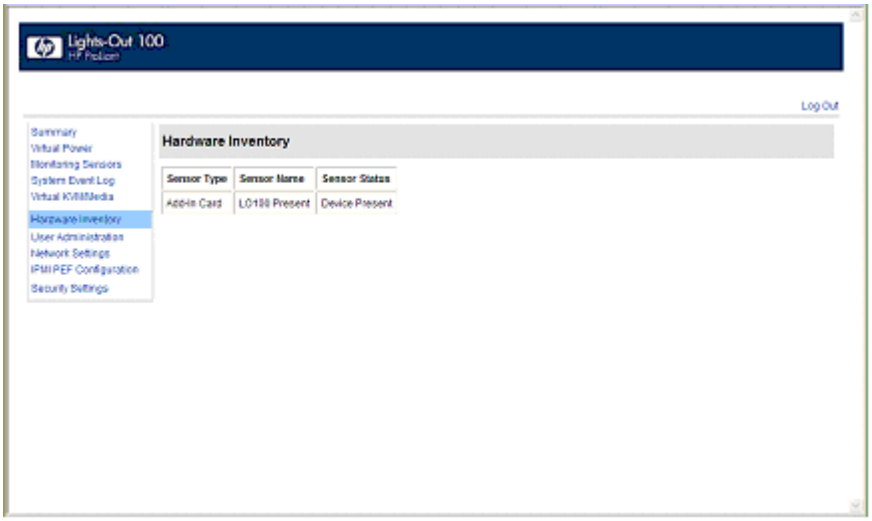
4. Press the **Esc** key to return to the previous screen, or press the **F10** key to save the changes and exit setup.

After enabling Windows® EMS management, you can view the Windows® EMS management console remotely from a client PC through an established telnet session to the IP address of the target server by pressing the **Esc+Q** keys. You can end an EMS session by pressing the **Esc+(** keys. See your operating system documentation for instructions on establishing telnet sessions.

NOTE: If you encounter problems logging in to the remote console, be aware that some telnet programs might require you to enable their `send line feed at end of line` option. If the remote console does not respond to the Enter key, try setting this option in your telnet program.

Hardware Inventory page

The Hardware Inventory page enables you to remotely identify the presence of processors on a target server. To access this page from a web browser on the main menu navigation bar, click **Hardware Inventory.**



User administration

The User Administration option on the main menu navigation bar enables you (if authorized) to edit the user name and password for existing users. You cannot create a new user. The user password is stored in

nonvolatile memory and can be changed through a web browser ("Changing user settings through a web browser" on page 47) or through the CLP ("Changing user settings through the CLP" on page 48).

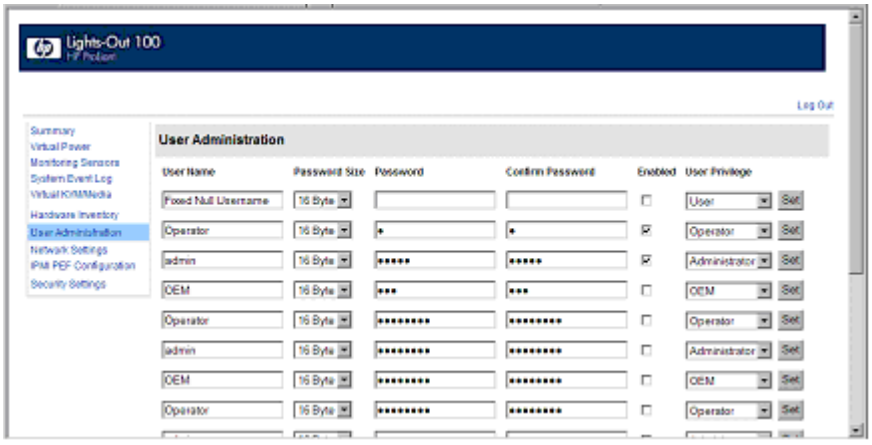
When using CLP, if you do not have the correct privileges a warning message appears. If you receive a warning message, you must end the telnet connection and re-establish a connection. There are no restrictions when logged in as either OEM or administrator. User and operator accounts have the following access.

Option	User	Operator
Hardware Inventory	Yes	Yes
Virtual Power	No	Yes
Monitoring Sensors	View only	Yes
System Event Log	Yes	Yes
Network Settings	No	No
PET Configuration	No	No
User Configuration	No	No
Virtual KVM	No	No
Application License Key	No	No
Security Settings	No	No

Changing user settings through a web browser

The User Administration screen displays user information, enables you to modify user settings, and enable or disable user accounts. The first user account is a fixed null value. You cannot change the properties of the first user or use it to log in. Only the first two users (after the fixed null value) are enabled for login by default. Users can only be enabled from the browser interface.

⚠ **WARNING:** Do not disable all user accounts. If you disable all user accounts you will not be able to log in to LO100. HP recommends always leaving at least one user with administrative privileges.



To modify user settings:

1. On the main menu navigation bar, click **User Administration.**
2. Enter the password in the Password and Confirm Password fields.

3. Select the **User Privilege** level from the list. For more information on user privileges and access rights, see "User administration (on page 46)."
4. (Optional) Change the user name.
5. To save the changes, click **Set.**

Changing user settings through the CLP

The first user is a fixed null value. Customizable users start at user2 and continue through user16. You can only enable users for log in through the browser. However, you can change the values through any connection.

1. Log in to the CLP as described in the "Logging in to LO100 (on page 26)" section.
2. At the command prompt, enter `cd map1/accounts`.
3. Select a user by entering `cd user1` or `cd user#`, where `#` is the user you want to modify and a whole number between 2 and 16.
4. To change the user name, enter `set username=<new username>`. For example:
   `/./map1/accounts/user2/> set username=testuser2`
5. To change the user password, enter `set password=<new password>` and enter the new password when prompted. For example:
   `/./map1/accounts/user2/> set password=testpswd2`

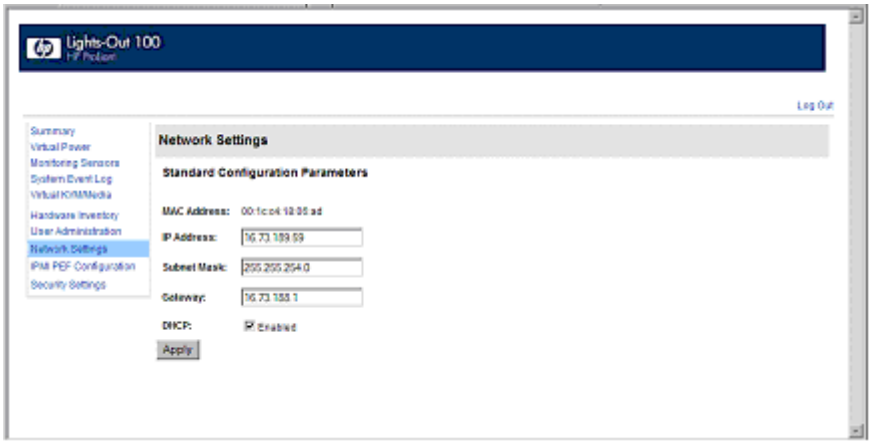
   Passwords are case-sensitive and can contain up to 16 characters.
6. To change the group name enter, `set group=<new group name>`. Valid group settings are administrator, user, oemhp, and operator. For example:
   `/./map1/accounts/user2/> set group=user`

Network settings

You can view and modify network settings for LO100 using a web browser, CLP, or the BIOS Setup Utility. If you change the IP address, the connection to the server terminates. You must reconnect to the server using the new IP address.

Configuring network settings using a web browser

The Network Settings screen displays IP address, subnet mask, and other TCP/IP-related settings. From the Network Settings screen, you can enable or disable DHCP and configure a static IP address for servers not using DHCP. You can view and modify the network settings when logged in as either OEM or administrator (admin).



To modify the network settings, on the browser main menu navigation bar, click **Network Settings,** enter the new settings, and then click **Apply.**

Configuring network settings using the CLP

1. Log in to LO100 CLP as described in the "Logging in to LO100 (on page 26)" section.
2. At the command prompt, enter `cd map1/nic1`.
3. Configure the network settings by entering the following: `set <network property>=<new setting>`. Configurable valid network properties are:
   - `networkaddress` specifies the IP address for the NIC. This setting is dynamic.
   - `oemhp_nonvol_networkaddress` specifies the IP address stored in non-volatile memory.
   - `oemhp_mask` specifies the subnet mask for NIC. This setting is dynamic.
   - `oemhp_nonvol_mask` specifies the subnet mask stored in non-volatile memory.
   - oemhp_gateway specifies the gateway IP address for the NIC. This setting is dynamic.
   - `oemhp_nonvol_gateway` specifies the gateway IP address stored in non-volatile memory.
   - `oemhp_dhcp_enable` specifies whether DHCP is enabled for the NIC. Boolean values are accepted
   - `oemhp_nonvol_dhcp_enable` specifies whether DHCP is enabled for the NIC and address stored in non-volatile memory.

Configuring network settings using the BIOS Setup Utility

To enable a static IP address:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.

4. To set your network BIOS settings, choose one of these options:
   - On ProLiant ML110 G4 and ML150 G3 servers:
   a. Press the down arrow (↓) key to scroll to the end, and select **DHCP IP Source.**
   b. Set DHCP IP Source to **Disabled.**
   c. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** key to move between address fields).
   - On ProLiant ML115 G1 servers:
   a. Press the down arrow (↓) key to scroll to the BMC LAN Configuration menu. Press the **Enter** key.
   b. Press the down arrow (↓) key to scroll to the end, and select **DHCP IP Source.**
   c. Set DHCP IP Source to **Disabled.**
   d. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** key to move between address fields).
   - On ProLiant DL140 G3 and ProLiant DL145 G3 servers:
   a. Press the down arrow (↓) key to scroll to the LAN Settings submenu. Press the **Enter** key.
   b. Set the IP Address Assignment to **Static.** This setting enables you to modify a static IP address through the BIOS Setup menu.
   c. Press the down arrow (↓) key to scroll down and enter a valid IP address, subnet mask, and gateway address (press the **Tab** or period (**.**) key to move between address fields).
5. Press the **F10** key to save and exit.

To enable a DHCP assigned address:

1. Press the **F10** key during POST to enter the BIOS Setup Utility.
2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. Choose one of these options:
   - On ProLiant ML110 G4 and ProLiant ML150 G3 servers:
   a. Press the down arrow (↓) key to scroll to the end and select **DHCP IP Source.**
   b. Set DHCP IP Source to **Enabled.**
   - On ProLiant ML115 G1 servers:
   a. Press the down arrow (↓) to scroll to the BMC LAN Configuration menu. Press the **Enter** key.
   b. Set DHCP IP Source to **Enabled.**
   - On ProLiant DL140 G3 and ProLiant DL145 G3 servers:
   a. Press the down arrow (↓) key to scroll to the LAN Settings submenu. Press the **Enter** key.
   b. Set the IP Address Assignment to **DHCP.**
5. Press the **F10** key to save and exit.

To enable telnet and HTTP services:

On ProLiant DL145 G3 servers, HTTP and telnet enabled by default. On ProLiant ML110 G4, ProLiant ML115 G1, and ProLiant ML150 G3 servers, HTTP and telnet are enabled after installing the HP ProLiant Lights-Out 100c Remote Management Card.

To enable telnet and HTTP on ProLiant DL140 G3 servers:

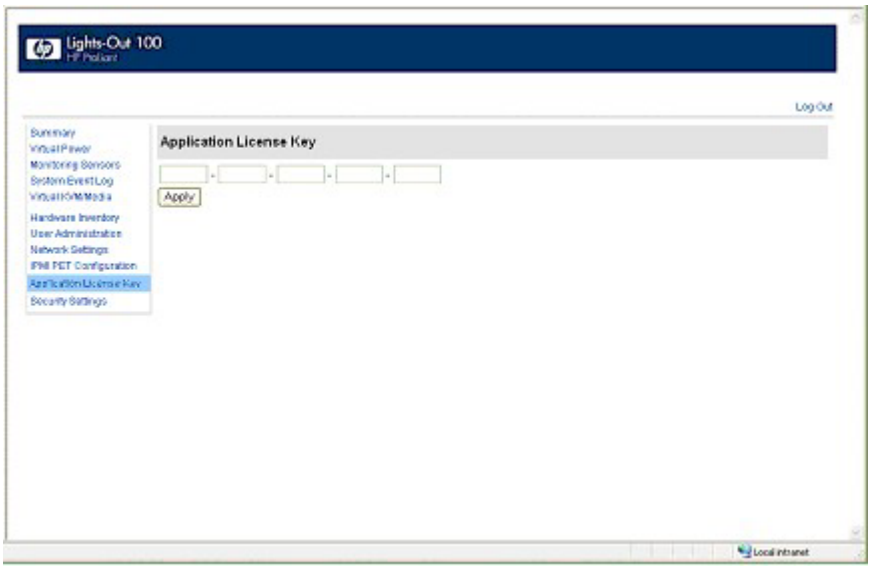
1. Press the **F10** key during POST to enter the BIOS Setup Utility.

2. Press the right arrow (→) key to navigate to the Advanced menu.
3. Press the down arrow (↓) key to scroll to IPMI. Press the **Enter** key.
4. Press the down arrow (↓) key to scroll to the LAN Settings submenu. Press the **Enter** key.
5. Press the down arrow (↓) key to scroll to the following settings, and set the parameters as needed (the following example shows configuring for LO100 access using telnet and a web page):
   - BMC Telnet Service: [Enabled]
   - BMC Ping Response: [Enabled]
   - BMC HTTP Server: [Enabled]

Installing a license key

The Application License Key option and screen is available on HP ProLiant DL140 G3 and ProLiant DL145 G3 servers.

1. Log in to LO100 through a supported browser.
2. To display the license activation screen, click **Application License Key.** If the Application License Key option is not available, you must update the LO100 firmware. For more information, see "Updating the firmware (on page 16)."



3. Enter the license key in the spaces provided. To move between fields, click inside a field, or press the **Tab** key. The Activation License Key field advances as you enter data.
4. Click **Apply.**

Importing a certificate

If you do not want to use the preinstalled public key (certificate), create and install your own private key (certificate). Importing a key or certificate is a one-time procedure that supports both SSH and SSL. The key must be generated using external third-party software, placed on a TFTP server, and uploaded to the LO100. For Microsoft® Windows®, if you do not have a TFTP software package, use `TFTPD32.EXE`, which is available on the Internet. Linux generally has a TFTP server installed with the operating system. If it is not, see your Linux documentation for more information.

NOTE: When you use the CLP load command with TFTPD32, HP recommends using a 4-second timeout and 10 retries.

NOTE: When using the CLP `load` command in Linux set the timeout to 15000000. The firewall built into some Linux systems might not allow the TFTP server to send and receive information. You might have to disable the firewall to allow these connections. If you are experiencing firewall issues, change the firewall settings to allow connections on port 69 (the default port for TFTP servers). See your firewall documentation for additional information.

Creating a certificate

LO100 requires a 1,024-bit DSA key stored in PEM (Base64-encoded) format to be located on a TFTP server. For example, the following process uses Win32 OpenSSL, downloaded from the Shining Light Productions website (http://www.slproweb.com/products/Win32OpenSSL.html), and the commands issued in a DOS window to generate the certificate. To generate a certificate using Win32 OpenSSL:

1. Download Win32 OpenSSL.
2. Install and set up OpenSSL.
3. Using OpenSSL, generate a DSA parameters file:

   ```
   openssl dsaparam -out server_dsaparam.pem 1024
   ```

4. Generate the DSA private key file, called server_privkey.pem:

   ```
   openssl gendsa -out server_privkey.pem server_dsaparam.pem
   ```

5. Generate the DSA certificate (public key) file, called server cacert.pem:

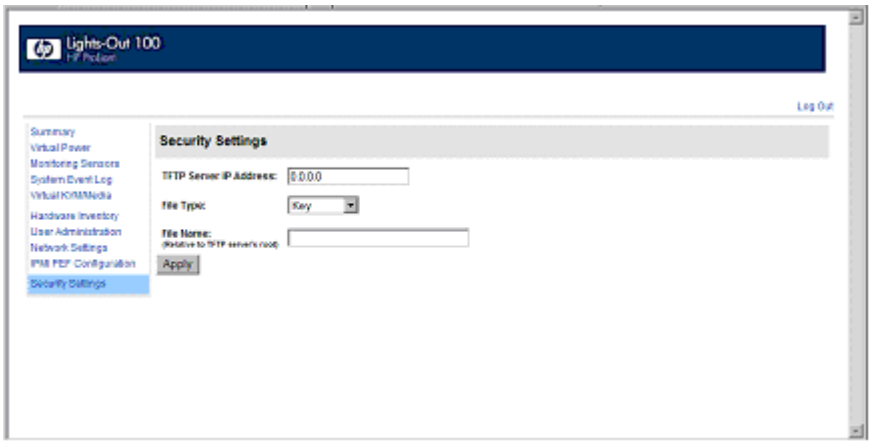
   ```
   openssl req -new -x509 -key server_privkey.pem -out server_cacert.pem -days 1095
   ```

6. When prompted for a distinguished name, enter an appropriate domain name for the servers that will be receiving the certificate.
7. After creating the certificate, copy it to a TFTP server that is accessible on the same network as LO100.

Before importing a certificate or key, you must disconnect from any remote KVMS sessions. Importing a key or certificate will disconnect your session and reset the LO100 processor. After importing a key or certificate and LO100 confirms a successful upload, you must log back into LO100.

Installing a certificate or private key through a web browser

The Security Settings page enables you to install new keys and certificates for SSL and SSH connections.



To install a certificate through the browser:

1. Log in to LO100 as an administrator.
2. On the browser main menu navigation bar, click **Security Settings.**
3. In the tftp server IP address field, enter the IP address of the TFTP server.
4. On the menu under File type, select **Certificate.**
5. Enter the file name of the certificate created (server_cacert.pem) in the File Name field. Include the path relative to the tftp server root in the file name.
6. Click **Apply.**

To install the private key through the browser:

1. Log in to LO100 as an administrator.
2. On the browser main menu navigation bar, click **Security Settings.**
3. In the tftp server IP address field, enter the IP address of the TFTP server.
4. On the menu under File type, select **Key.**
5. Enter the file name of the key created (server_privkey.pem) in the File Name field. Include the path relative to the tftp server root in the file name.
6. Click **Apply.**

Installing a certificate or private key through the CLP

To install a certificate, log in to LO100 as administrator through the CLP interface and issue the load command to upload and install the certificate. For example:

```
load -source <URI> -oemhpfiletype cer
```

where:

- `<URI>` is the `//tftpserver IP/path/filename` to be downloaded.
- `tftpserver` is the URL or IP address of the TFTP server containing the certificate.
- `Path` is the path of the file relative to the TFTP server root.
- `filename` is the file name of the certificate file (`server_cacert.pem` in this example).

You can also find these commands in /map1/firmware directory.

NOTE: After using the `load` command LO100 will reset ending your CLP interface session. You must reconnect to the CLP interface.

To install a private key, log in to LO100 as administrator through the CLP interface and issue the load command to upload and install the certificate. For example:

```
load -source <URI> -oemhpfiletype key
```

where:

- `<URI>` is the `//tftpserver IP/path/filename` to be downloaded.
- `tftpserver` is the URL or IP address of the TFTP server containing the private key file.
- `Path` is the path of the file relative to the TFTP server root.
- `filename` is the file name of the private key file (`server_privkey.pem` in this example).

You can also find these commands in /map1/firmware directory.

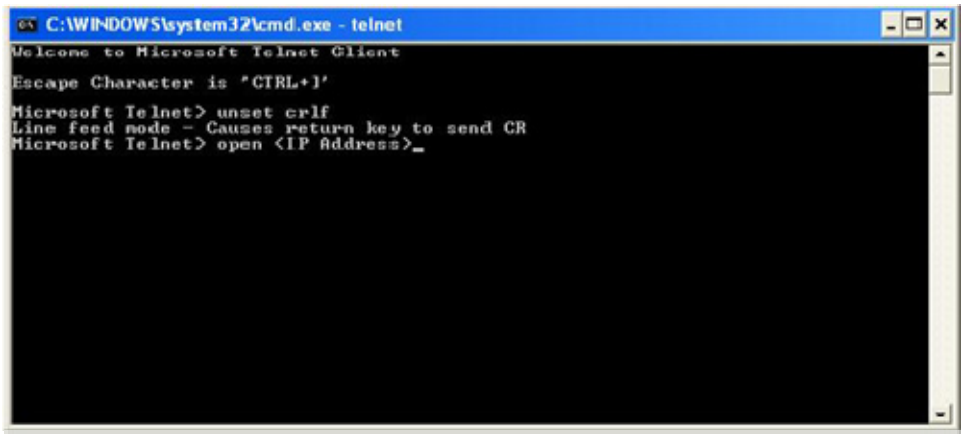
NOTE: After using the `load` command LO100 will reset ending your CLP interface session. You must reconnect to the CLP interface.

Resolving character and line feed issues

HP recommends using similar operating systems to communicate between the CMS and your applications or workstations. For example, if you are running a Linux CMS, run Linux on your workstations, and use a Linux telnet client. Likewise, if you are running a Windows® CMS, run Windows on your workstations, and use a Windows® Telnet client.

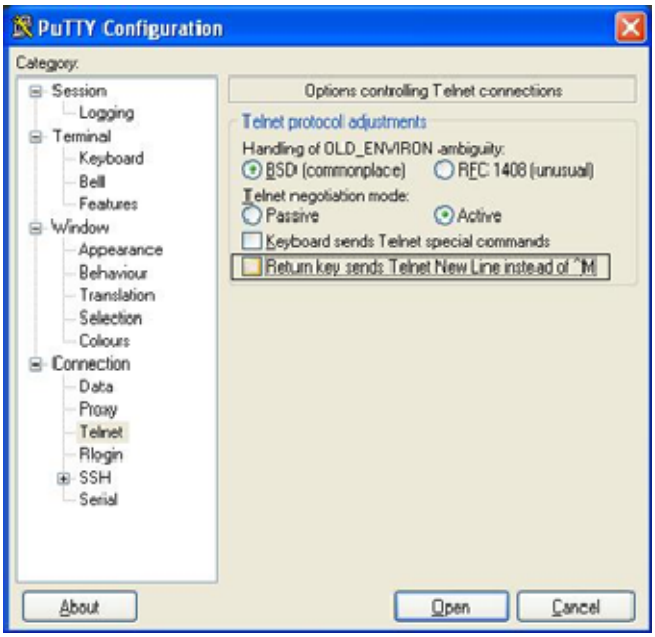
If you run multiple operating systems in your environment, an application limitation issue might occur. For example, running Linux on your servers and using a Windows® Telnet client or PuTTY might cause an end of line character issue. If you experience issues, do one the following:

- For a Windows® Telnet client to Linux console redirection configuration, make sure Windows® Telnet sends a CR for the line feed. To set CR, use the following command for Windows® Telnet:
  `unset crlf`


C:\WINDOWS\system32\cmd.exe - telnet
Welcome to Microsoft Telnet Client
Escape Character is 'CTRL+]'
Microsoft Telnet> unset crlf
Line feed mode - Causes return key to send CR
Microsoft Telnet> open <IP Address>_

- For applications such as PuTTY with Linux redirection:
  a. Click **Connection>Telnet**.

b. Clear **Return key sends Telnet New Line instead of ^M.**



LO100 has a default of 0x08 (input) and 0x03 (output) filter setting that must not be changed. If the default settings are changed, functionality issues might occur and you must restore the default settings. After the defaults are reset, you must log out and back in to the shell to restore normal functionality. To restore the default settings, use the following IPMI commands for your environment and operating system:

- To set telnet inbound to 0x08:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 00 02 00 08 b4`
  - DOS: `ipmitool 20 c0 29 01 00 00 02 00 08`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x00 0x02 0x00 0x08`
- To set telnet outbound to 0x03:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 00 02 01 03 b8`
  - DOS: `ipmitool 20 c0 29 01 00 00 02 01 03`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x00 0x02 0x01 0x03`
- To set SSH inbound to 0x08:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 01 02 00 08 b3`
  - DOS: `ipmitool 20 c0 29 01 00 01 02 00 08`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x01 0x02 0x00 0x08`
- To set SSH outbound to 0x03:
  - CLP: `oemhp I 20 c0 20 18 00 29 01 00 01 02 01 03 b7`
  - DOS: `ipmitool 20 c0 29 01 00 01 02 01 03`
  - Linux: `ipmitool raw 0x30 0x29 0x01 0x00 0x01 0x02 0x01 0x03`

For example, to restore the default setting using telnet in Windows®:

1. Log in to the CLP interface from a Windows® Telnet client.
2. Change the directory to map1 using the command:
   `cd map1`

3. Set input default to 0x08 using the command:
   ```
   oemhp I 20 c0 20 18 00 29 01 00 00 02 00 08 b4
   ```
4. Set output default to 0x03 using the command:
   ```
   oemhp I 20 c0 20 18 00 29 01 00 00 02 01 03 b8
   ```
5. Log out.

Technical support

HP contact information

For the name of the nearest HP authorized reseller:

- See the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
  - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
  - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (http://www.hp.com/hps).
- In other locations, see the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP SIM support

HP SIM discovers LO100 and enables you to identify and launch LO100. See your HP SIM user guide for more information on using HP SIM with LO100.

Acronyms and abbreviations

BIOS

Basic Input/Output System

BMC

baseboard management controller

CLI

Command Line Interface

CLP

command line protocol

CMS

central management server

CR

carriage return

DHCP

Dynamic Host Configuration Protocol

DSA

Digital Signature Algorithm

EMS

Emergency Management Services

ESD

electrostatic discharge

HTTP

hypertext transfer protocol

IP

Internet Protocol

IPMI

Intelligent Platform Management Interface

JVM

Java Virtual Machine

KVM

keyboard, video, and mouse

LF

line feed

LO100

HP Lights-Out 100 Remote Management processors

MAC

Media Access Control

NIC

network interface card

PEF

Platform Event Filtering

PEM

Privacy Enhanced Mail

PET

Platform Event Trap

POST

Power-On Self Test

RBSU

ROM-Based Setup Utility

SLES

SUSE Linux Enterprise Server

SMASH

System Management Architecture for Server Hardware

SSH

Secure Shell

SSL

Secure Sockets Layer

TCP/IP

Transmission Control Protocol/Internet Protocol

TFTP

Trivial File Transfer Protocol

UID

unit identification

URL

uniform resource locator

VNC

virtual network computing

Index

A

accessing software, browser 11, 26
administration 10
alert messages 32
authorized reseller 57

B

base management controller (BMC) 10, 14, 16, 33, 43, 49
BIOS console, access 41
BIOS console, text redirection 42
BIOS Setup Utility 10, 11, 14, 15, 16, 29, 30, 33, 42, 43, 45, 49
BIOS upgrade 16
BMC (base management controller) 10, 14, 16, 33, 43, 49
browser-based setup 49

C

certificates 51, 52, 53
CLP (Command Line Protocol) 19, 26, 29, 33, 34, 41, 48, 49, 53
CLP overview 19
CLP, commands 29, 33, 49
CLP, connection options 19
CLP, general syntax 20, 21, 25
Command Line Protocol (CLP) 19, 26, 29, 33, 34, 41, 48, 49, 53
configuration, LOM processor 10
configuration, network 10, 48
configuration, PET 32
connectors, illustrated 9
console redirection 12
contact information 57
CR/LF translation 54

D

data protection methods 18
dedicated management port 13
defining hot keys 38
DHCP (Dynamic Host Configuration Protocol) 13, 14, 15, 32, 49
DHCP addresses 14
DHCP, disabling 15
DHCP, enabling 14
Digital Signature Algorithm (DSA) 52
Dynamic Host Configuration Protocol (DHCP) 10, 14, 15, 49

E

EMS (Emergency Management Services) 45
EMS Console 45
enabling HTTP 15
enabling telnet 15
encryption 18
Ethernet connections 13
event logs 32, 33, 34

F

features, CLP 19
features, IPMI 2.0 25
features, LO100 5
features, SSL 18
firmware, updating 16
flash ROM 16

H

hardware inventory 46
help resources 57
HP Systems Insight Manager, support 57
HP technical support 57
HP website 57
HP, contacting 57
HTTP (hypertext transfer protocol) 6, 11, 15, 49

I

importing, certificates 51
installation instructions 8, 9
installation requirements 8
installation, management card 8, 9
Intelligent Platform Management Interface (IPMI) 5, 25, 32, 34

IP (Internet Protocol) 14, 15, 27, 49
IP address assignment 15
IPMI (Intelligent Platform Management Interface) 5, 25, 32, 34
IPMI support 25

K

key, license 51
key, private 53
keyboard, video, mouse (KVM) 5, 37, 46
keys, system 38
kit contents, LO100c management card 8
KVM, (keyboard, video, mouse) 5, 37, 46

L

license key, installing 51
Linux procedures 15, 43
Linux, console redirection 43
LO100, logging in through browser 26
logging in 26
logging in, through the CLP 26

M

MAC (medium access control) 32, 37, 38
main menu functions 27
medium access control (MAC) 32, 37, 38
monitoring sensors 29
mouse settings 37

N

network access 10
network interface card (NIC) 5, 10, 11, 12, 13, 49
network settings 10, 48, 49
NIC (network interface card) 5, 11, 12, 13, 49

O

OpenSSH utility 19
operational overview 5
overview, CLP 19
overview, product 5
overview, server management 5
overview, SSH 18
overview, SSL 18

P

passwords 47, 48
PEF (Platform Event Filtering) 29, 30, 32
PEF entries, configuration 30
PEM (Privacy Enhanced Mail) 52, 53
PET (Platform Event Trap) 52, 53
phone numbers 57
Platform Event Filtering (PEF) 29, 30, 32
Platform Event Trap (PET) 52, 53
POST (Power-On Self Test) 10, 43
post-installation procedures 9
power control options 28, 29
Power-On Self Test (POST) 10, 43
preinstallation, guidelines 8
Privacy Enhanced Mail (PEM) 52, 53
private key 53
privileges, user 46
processors 46
PuTTY utility 19

R

RBSU (ROM-Based Setup Utility) 34
remote console, applet settings 37
remote console, using 41
remote graphic console, applet 35
remote management card connectors 9
remote management processor, logging in through CLP 26
remote management, browser main menu 27
remote server power, controlling 28
required information 57
requirements, SSH 18
ROM-Based Setup Utility (RBSU) 34
ROMPaq utility 16

S

safety considerations 8
Secure Shell (SSH) 5, 6, 18, 19, 26, 51, 53
Secure Sockets Layer (SSL) 5, 6, 18, 51, 52, 53
sensor data 29, 30
serial port 11
serial port, BIOS console configuration 12
serial port, enabling 11
settings, mouse 37
settings, network 48
settings, PEF 30
settings, power options 28, 29
shared storage devices, adding 41
shared storage devices, removing 41
side-band connection 13
SLES (SUSE Linux Enterprise Server) 37

SMASH (System Management Architecture for Server Hardware) 5, 6, 19
SSH (Secure Shell) 5, 6, 18, 19, 26, 51, 53
SSH keys, importing 51, 53
SSH utility 18
SSL, (Secure Sockets Layer) 5, 6, 18, 51, 52, 53
SSL, importing key and certificate 51
SSL, overview 18
SSL, using 18
static IP addresses 15
storage devices, adding 40
storage devices, sharing 41
storage devices, using 39
support, HP Systems Insight Manager 57
support, IPMI 25
SUSE Linux Enterprise Server (SLES) 37
system buttons 38
system event log, access through the BIOS 33
system event log, access through the CLP 33
system event logs 32, 33
System Management Architecture for Server Hardware (SMASH) 5, 6, 19

T

technical support 57
telephone numbers 57
telnet 15, 42, 54
TFTP (Trivial File Transfer Protocol) 16, 21, 51, 52, 53
Trivial File Transfer Protocol (TFTP) 16, 21, 51, 52, 53

U

UID (unit identification) 6
uniform resource locator (URL) 16, 53
unit identification (UID) 6
URL (uniform resource locator) 16, 53
user access 10, 46
user account, modifying 10, 46, 47, 48
user and configuration settings 10, 46, 47, 48
using, LO100 18

V

virtual devices 39
virtual network computing (VNC) 37
virtual power 28
VNC (virtual network computing) 37

W

website, HP 57
Windows EMS Console, enabling 45